TECHNOLOGY DEPT

Gas Journal

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VOL. 284. 107th YEAR. LONDON, OCTOBER 12, 1955 PRICE 1/6

THE
PARKINSON
'ZEPHYR'

ARKINSON & COWAN GAS METERS

FIG. 150

modern H.P. design

Double-faced Modern H.P. Design. Corrosion Resisting Steel Door. Special Resilient Non-Metallic Composition Seats. Self-Lubricated. Seats enclosed and protected from Dust and Dirt in both Open and Closed Positions. Simple and Robust in Construction. Positive in operation. No Internal Operating Mechanism exposed to Gas Stream. No Wedges or Springs. Cannot Jam—Open or Closed. Spindle can be Repacked in the Open or Closed Position. Standard Test Pressure 100 lbs. per Sq. In. Air. Internal or External Screw with or without Indicator. Can be Adapted for Under-Pressure Connections. A High Pressure Valve at a Low Pressure Price. Sizes 3" to 24" Horizontal and Vertical.

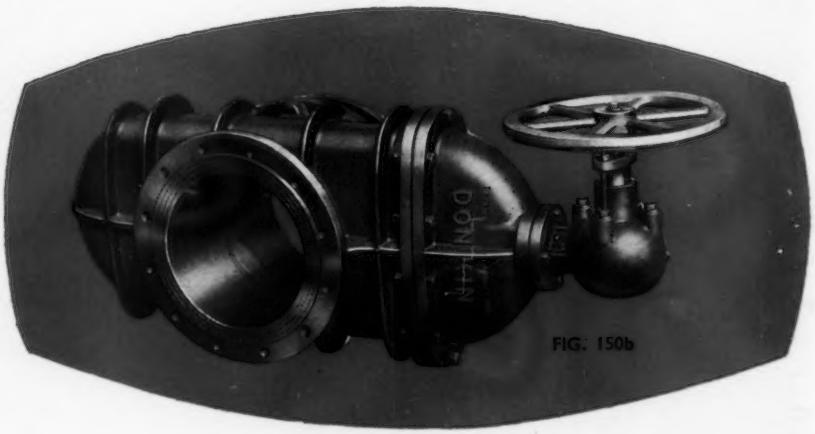


FIG. 150b

THE DONKIN VALVE

THE BRYAN DONKIN COMPANY LIMITED

CHESTERFIELD · (TEL : 3153) · **LONDON**

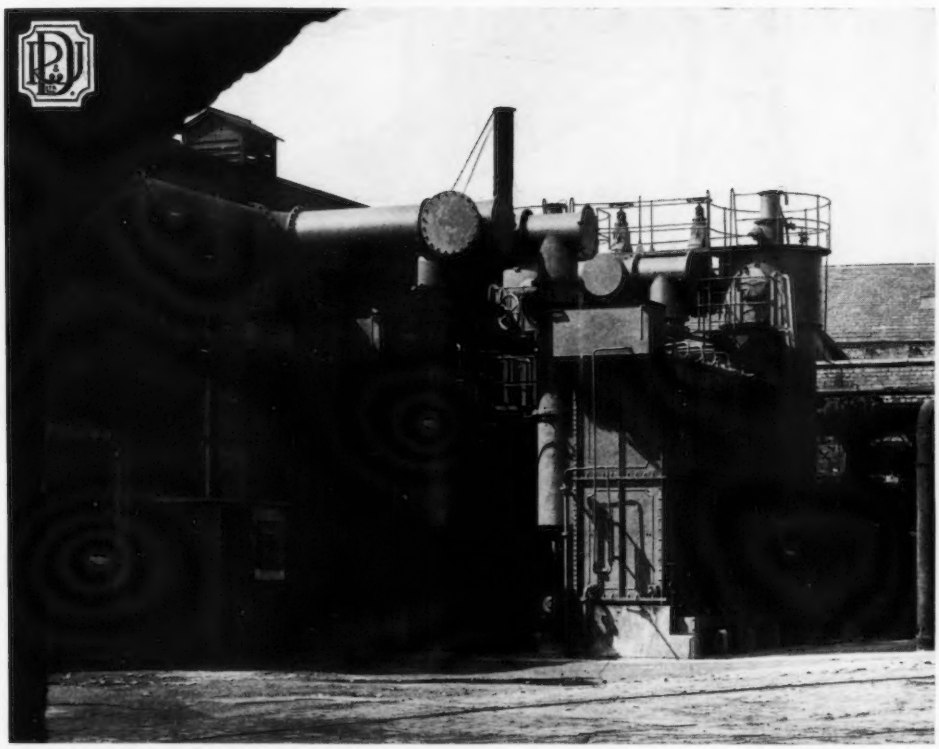
Makers of Gas Valves for over 100 Years

MVIA

THE SOCIETY OF BRITISH GAS INDUSTRIES

Washing Efficiency
$\frac{CO_2}{NH_3}$ ratio
Partition Factor
Wetting Factor
Residence Time
qk
Contact Time
Temperature
Bay Efficiency
Number of Stages
Mass Transfer Co-efficient
Slip

DEMPSTERS of MANCHESTER consider every aspect of technical WASHER DESIGN and will gladly help you to solve your problems



A recent installation of Cast-Iron STATIC AMMONIA WASHERS by R. & J. Dempster Ltd.
(Photograph by courtesy of the North-Eastern Gas Board)

Our GAS WASHING and AMMONIA RECOVERY PLANT is mechanically efficient and technically sound

Your orders and enquiries will be welcomed by:—

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DEMPSTER
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Constructional Gas & Chemical Engineers
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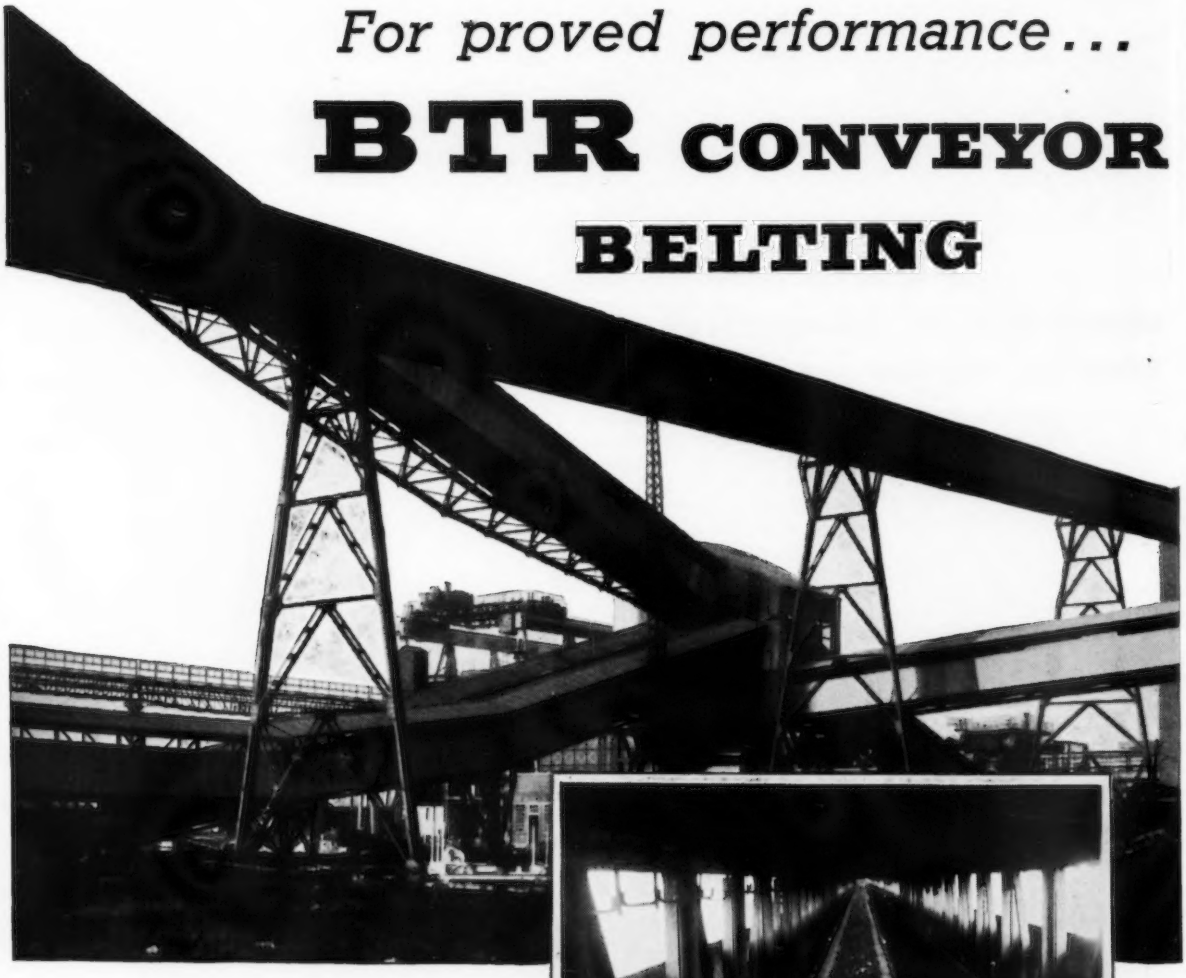
London Office: 34, VICTORIA STREET, S.W.1.

We make:—BY-PRODUCT and CHEMICAL PLANT · CONDENSERS · DETARRERS · GASHOLDERS · GAS VALVES and CONNECTIONS · IRON CASTINGS · PURIFIERS · STILLS · TANKS · WASHERS · WELDED and RIVETED STEELWORK

For proved performance...

BTR CONVEYOR BELTING



The vast Bromley-by-Bow Gas Works, supplying a highly industrialised, densely populated area, relies for its mechanical handling on BTR Conveyor Belting. From barge to Retort House, from Retort House to coke hoppers, the continuous and efficient performance of the entire network is closely bound up with the strength and load-carrying ability of this belting.

Conveyor systems in many large gas works, like Bromley-by-Bow, are equipped throughout with BTR belting—for long service life, low maintenance costs and non-stop efficiency under really arduous conditions. FOR PROVED PERFORMANCE . . . insist on BTR CONVEYOR BELTING.

Main coal conveyor about 830 ft. long equipped with 30 in. wide BTR conveyor belting travelling at 350 ft. a minute, designed to carry 200 tons of coal an hour.

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ENGINEERS IN RUBBER

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THE GAP AND THE SCRAP

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Every year, hundreds of thousands of tons of Scrap vital for steel-making are imported from abroad.

Every additional ton of Scrap produced at home means a ton less of imported Scrap.

You can help to bridge this gap by combing your works for every possible ton of idle Scrap, obsolete Plant, and unwanted Steel Structures.

Offer it all to us. We will quickly make it fit for re-melting and rush it to the Iron and Steel works, which need it so badly.

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Established 1834

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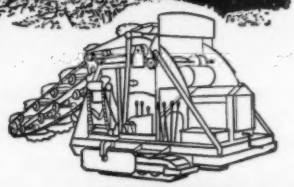
The answer to all your trenching problems

ALLEN *Super Duty* TRENCHERS

For narrow trenches we supply the 12/21 model, and for wide trenches the 16/60 model. Both models are a fine engineering job and capable of standing up to continuous hard work. We shall be pleased to send you further information and fully illustrated brochures on request.



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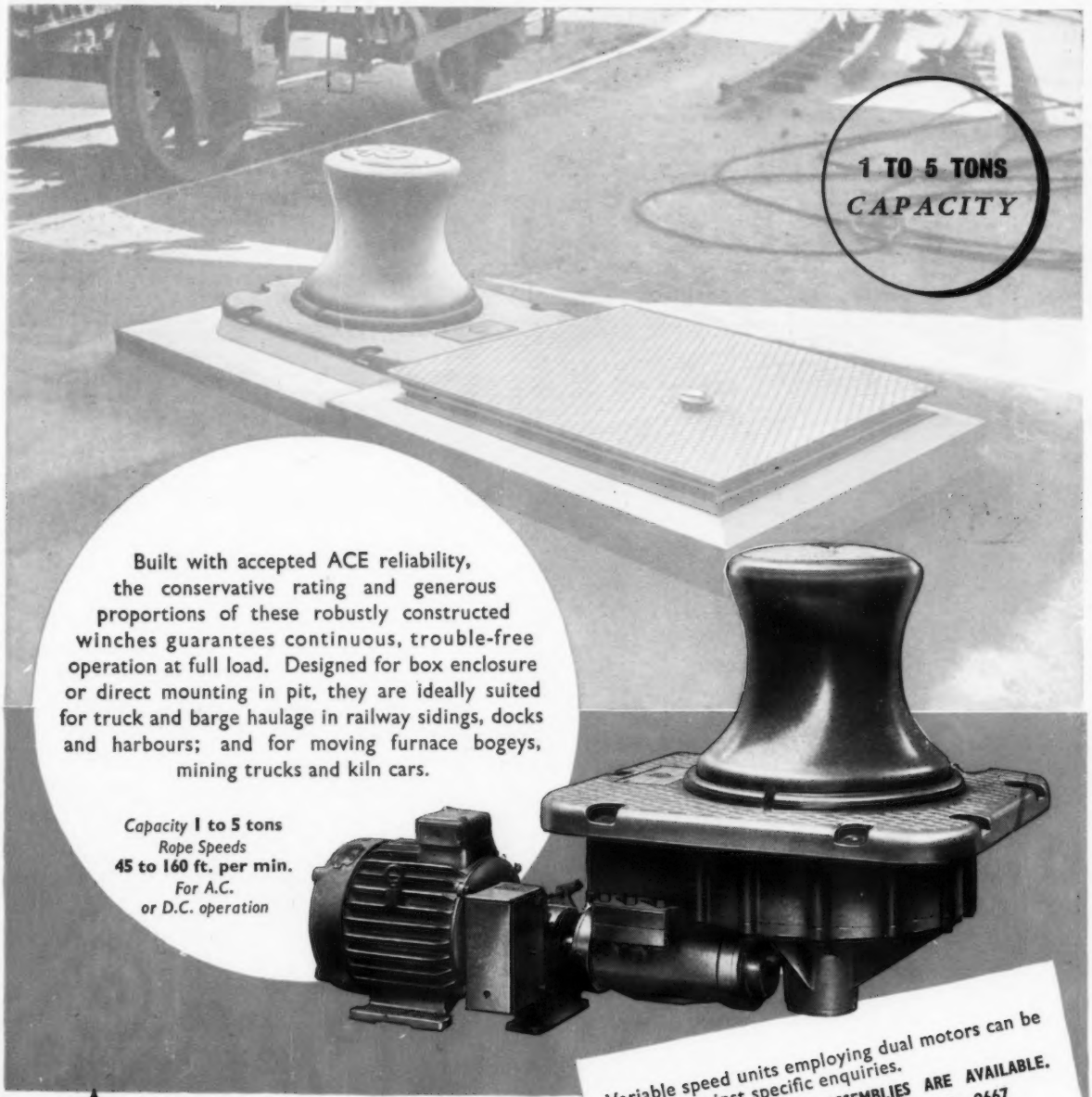
ELECTRIC

CAPSTAN WINCHES



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Capacity **1 to 5 tons**
Rope Speeds
45 to 160 ft. per min.
For A.C.
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Variable speed units employing dual motors can be supplied against specific enquiries.
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Telephone: EALing 6262 (5 lines) *And at BRIXTON, S.W.2.*
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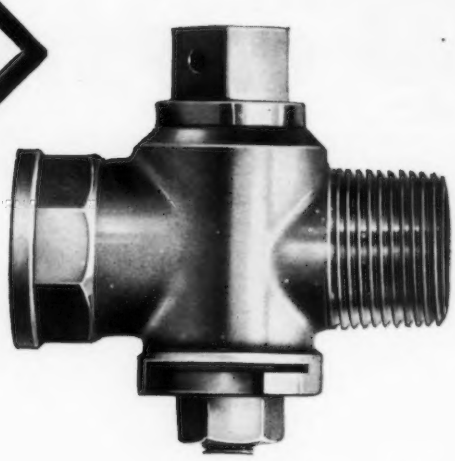
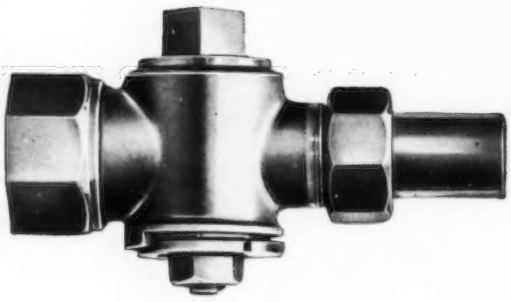


WILLEY



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are dependable

IN the production of brass cocks, as in that of all Willey fittings, precision is the keynote. Examine a Willey cock closely—for its design, its workmanship, and its finish. You won't find a better—a more *dependable*—cock anywhere.

Main cocks can be supplied in castings or hot pressings, male × female, or female × cap and lining for lead or copper, and in polished brass or with chromium-plated finish.

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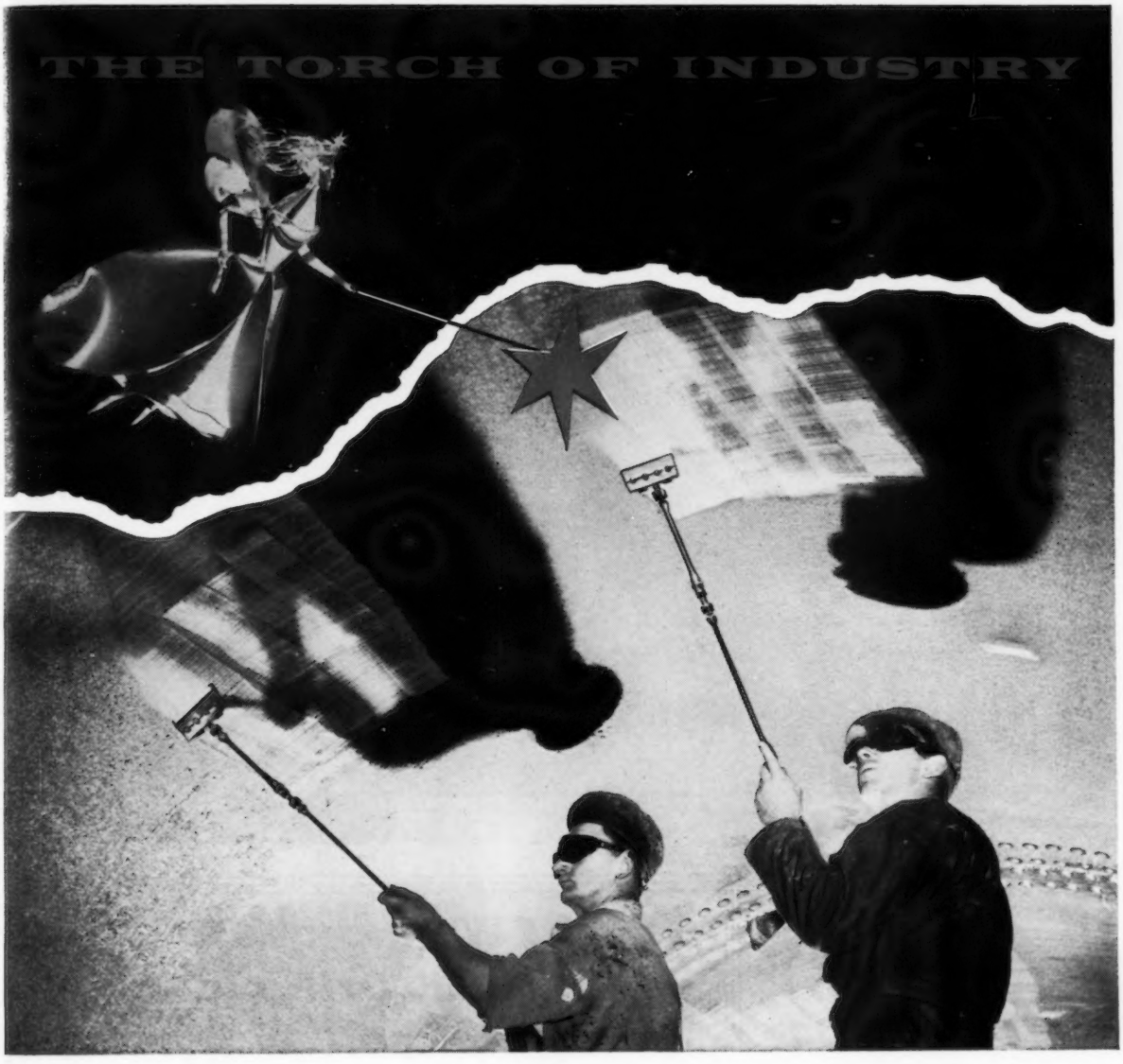
Associated Company of United Gas Industries Ltd.



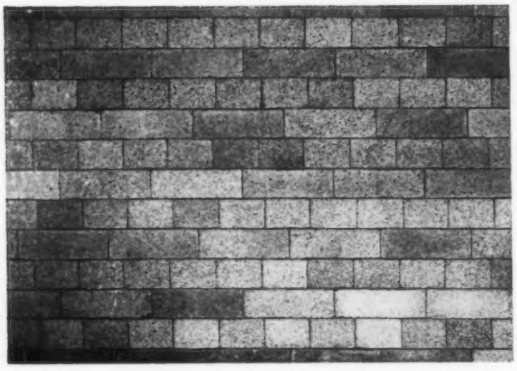
Longer service through Flame Cleaning

This 10′ diameter steel pipe is the main conduit for water to the Power House in the Glenshira Hydro-Electric scheme.

Flame Cleaning was employed to prepare the steel before painting. An excellent recommendation for the process is the fact that this conduit will be in service for many years before any maintenance will be possible.

BOC BRITISH OXYGEN

STEIN *Refractories*



THE STRENGTH OF FURNACE BRICKWORK—and durability of the furnace lining in service is greatly controlled by the joints. Well shaped bricks of accurate size, use of a Refractory Cement correctly chosen for the purpose, combined with good bricklaying (which means thin, tight joints) gets a furnace lining off to a good start. A Refractory Cement should be selected just as carefully as the brick with which it is to be used. We are always very willing to give our advice on the best type of Cement for particular applications.

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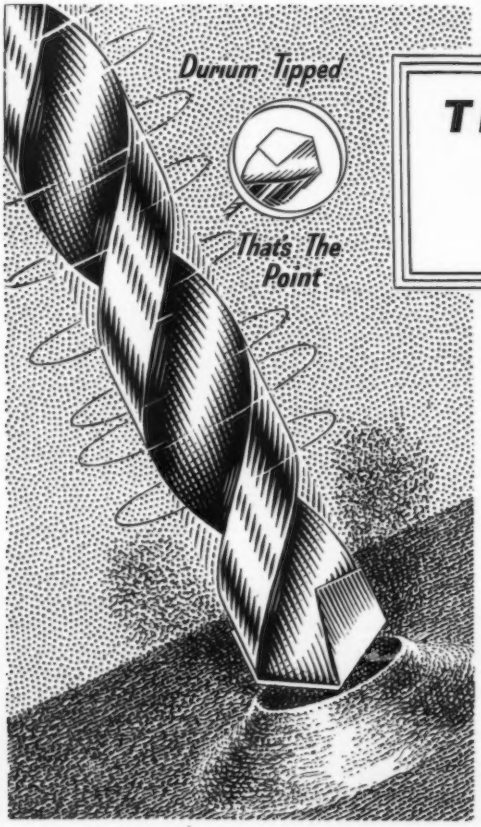

The NEW improved 'Durium' Drill clears spoil as it cuts

CUTS FASTER · LASTS LONGER · COSTS NO MORE

It's exclusive to Durium Drills—the completely new patented flute profile which expels the spoil continuously and automatically without clogging or packing even in deep holes and damp brickwork. With this new improved Durium Tipped Drill, clean round holes are made in masonry, faster than ever before.
This new flute profile also has the dual advantage of providing a stronger than ever backing to the "DURIUM" tip. The result—the finest masonry drill manufactured today.
You must use them on your next masonry drilling job. They can be used in hand or suitable electric drills. *Free descriptive folder will be sent on request.*

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Registered Trade Mark
RAPID CLEARING TYPE DRILLS FOR MASONRY AND ALL TILES

"BROOMWADE" is best . . . *for the toughest jobs!*

The RB 770—"BROOMWADE'S" latest breaker—is a long stroke, hard-hitting tool with plenty of stamina for the tough jobs.

It is earning a fine reputation all over the world because it is a highly efficient tool, has a minimum number of components, and is easily operated without fatigue to the operator.

"BROOMWADE" equipment proves its superiority on the world's toughest and most vital construction projects.

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331 SAS

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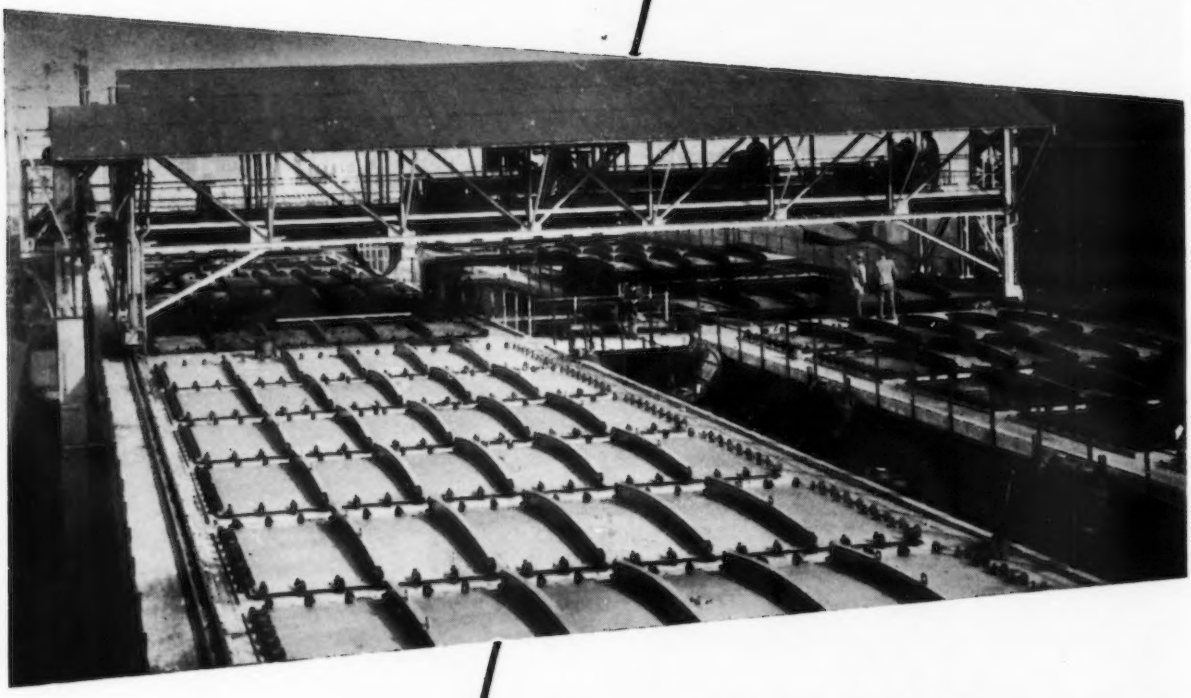

THE MODERN WAY

SPECIAL FEATURES OF THIS PLANT:

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GRAVITY-WEIGHTED CABLE REELING DRUM
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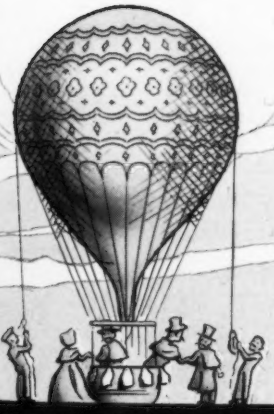
WE ALL DEPEND ON GAS



This coin plate has a setting range of 12 to 312 cu. ft. per shilling. A distinct advantage is the use of a single slot, through which both 6d. or 1/- coins, or both, can be taken by a simple adjustment of a clearly marked bracket located at the rear of the coin plate. The facilities for optional setting are clearly marked and the satin chrome and black finish on the embossed index plate is both attractive and durable. An ingenious cam action on the coin plate tends to draw the coins into the pocket.

George Wilson Gas Meters Ltd.,

COVENTRY · JARROW · LONDON · MANCHESTER · WOLVERHAMPTON · GLASGOW

Double Pass and Treble Pass ECONOMIC BOILERS

HIGH VELOCITY
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STEEL SECTIONAL
HOT WATER
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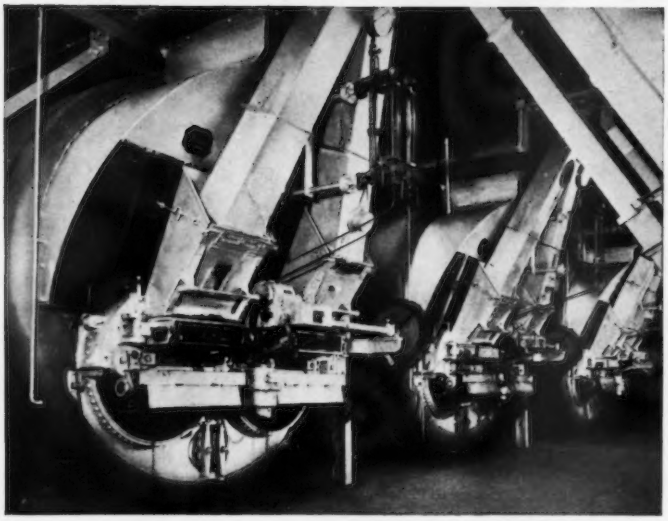

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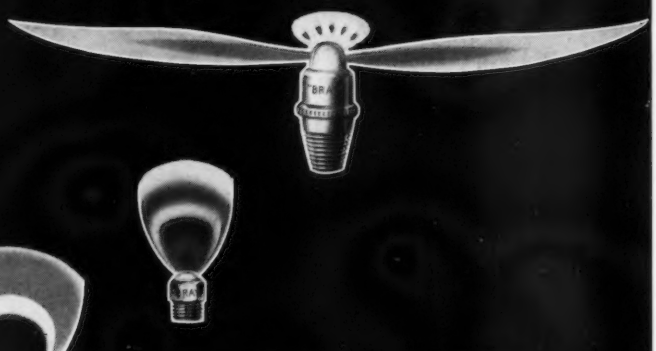

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Lockheed controls at the new gas works at Dumbarton

This important plant has 64 Glover-West continuous vertical retorts, all of which are fitted with Lockheed hydraulically operated extractor gear. The producer-grates are also driven by Lockheed hydraulics.

This practice is similar to that employed in so many other important installations fitted with Lockheed Hydraulic Controls.

Lockheed

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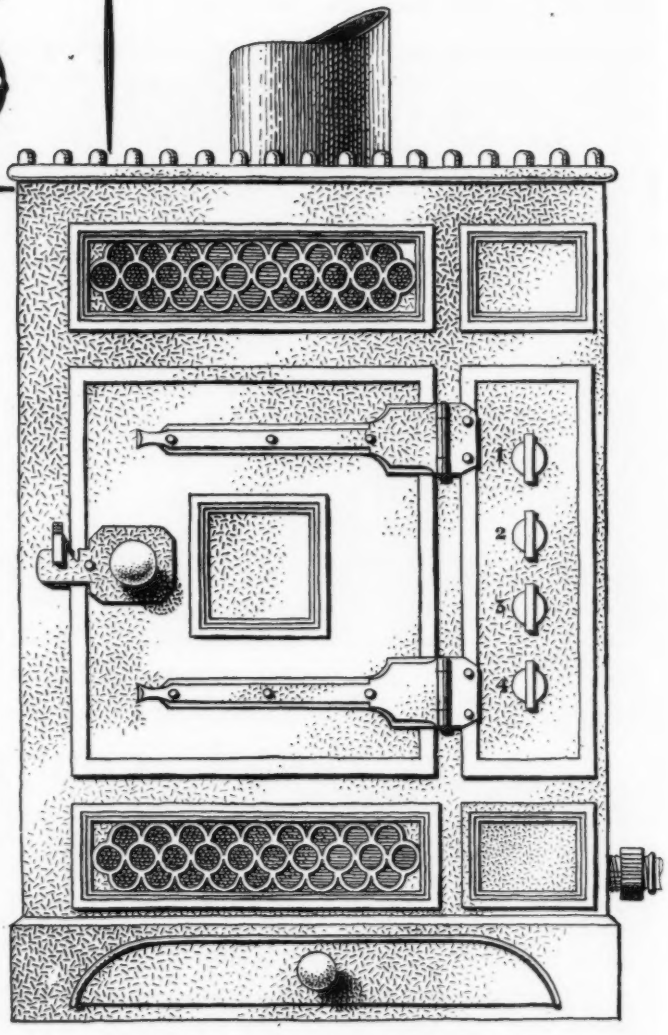
THE PROGRESS OF GAS

1850



The Liverpool Gas Cooking Range, designed by Alfred King, about 1850

Frederick Winsor, founder of the National Light & Heat Company, (forerunner of the Gas Light & Coke Co.) claimed to be the first to make it feasible to "cook, melt, boil and distil by a gas fire, either in a kitchen or dining-room". But there is no evidence that he ever made good this claim, and lighting remained the main function of gas for many years.

The earliest experiments in making gas stoves began in the 1820s: Clegg in 1824 saw men at the Aetna Iron works making a primitive type of gas oven. Then in 1841, Alexis Soyer, famous chef of the Reform Club, installed two gas stoves in the new kitchens he had designed for the club.

By 1850, several comparatively efficient gas stoves were on the market. Probably the best was Alfred King's Liverpool Gas Cooking Range, which has the distinction of being the first ever illustrated in an advertisement in the technical press — in the *Journal of Gas Lighting* (now the *Gas Journal*) for 1850, from which this illustration was taken. In the latter half of the century, cookers, heaters and water heaters were all in use.

Issued by Imperial Chemical Industries Limited for the interest of the gas industry — an important user of

I.C.I. copper tubes
capillary and compression fittings

Including: 'KUTERLON' underground copper tubes
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Purifiers

OVERHEAD 4 TIER CAST-IRON PURIFIERS RECENTLY COMPLETED FOR GREAT HARWOOD (ACCRINGTON) GASWORKS

Photograph by Courtesy N.W.G.B.

FIVE BOXES EACH 30′-0″×35′-0″×10′-0″ DEEP

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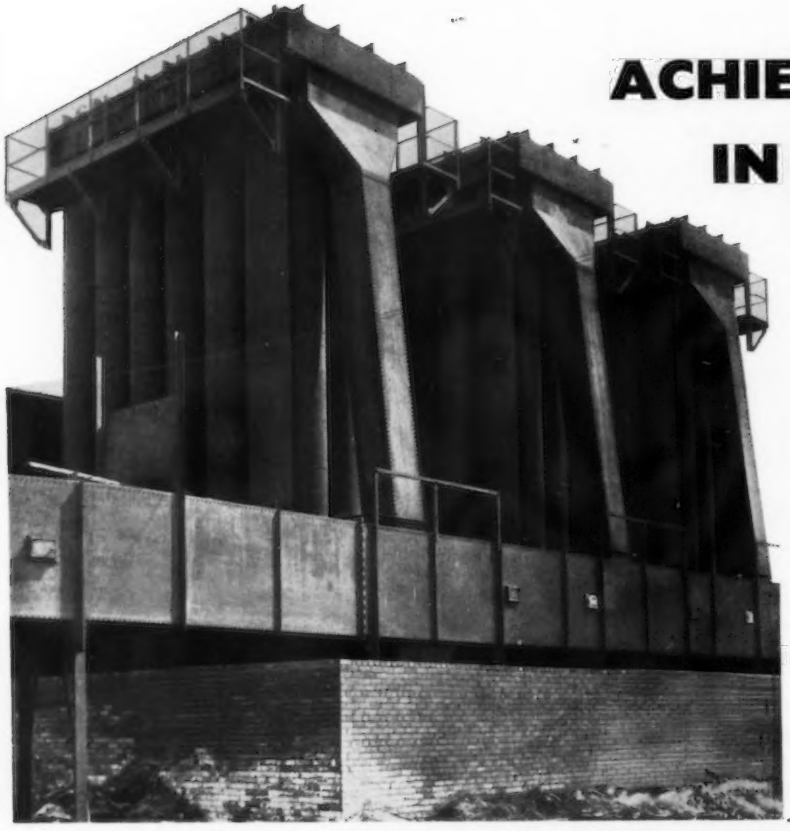
London Office:– **STAFFORD HOUSE, NORFOLK STREET, STRAND, W.C.2.**

Telephone: TEMple Bar 9910. *Telegrams:* Washer, Estrand, London.



ACHIEVEMENTS IN STEELWORK

The Gas Cooling Plant for a smelting works shown here was fabricated and erected by Robert Watson, specialists in electrically welded structures, steel buildings, tanks, pressure vessels and all classes of structural steelwork.

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BOLTON, LANCS.
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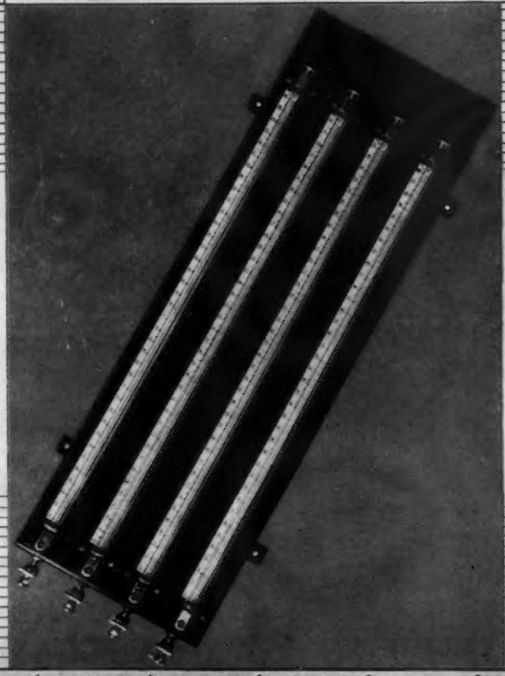
SINGLE TUBE PRESSURE GAUGES



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MILTON HOUSE WORKS
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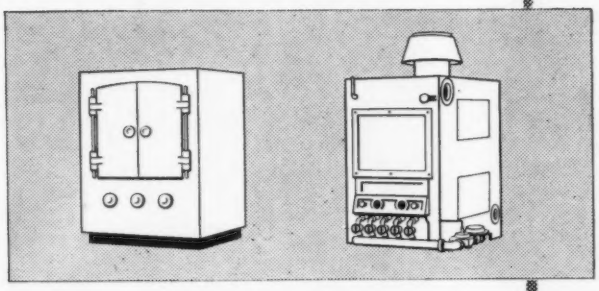
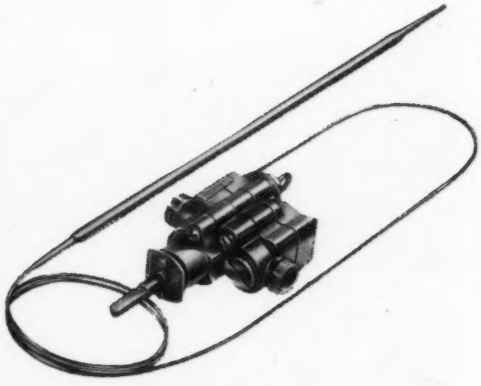
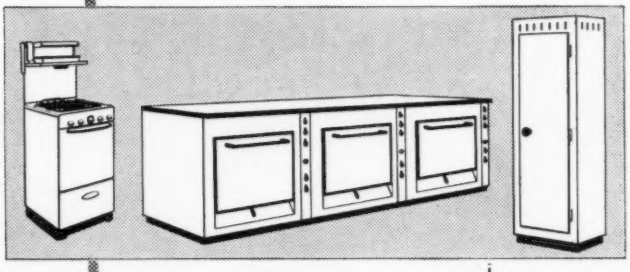
MIDLAND METER WORKS VICTORIA ROAD

Type TJ Automatic Safety Device
Gives quick, complete flame cut-off if pilot or gas supply fails. Easy hand resetting. Alternative jets for town and bottled gas. For almost any industrial gas-fitted installation.



For the
CONTROL
that spells efficiency–





Capillary Type Gas Cock Thermostat
The sensitive element and valve unit can each be mounted in the most satisfactory position independently of each other. Standard fitting on Cannon A125 and De La Rue "Warwick" gas cookers.

–the Automatic Choice is

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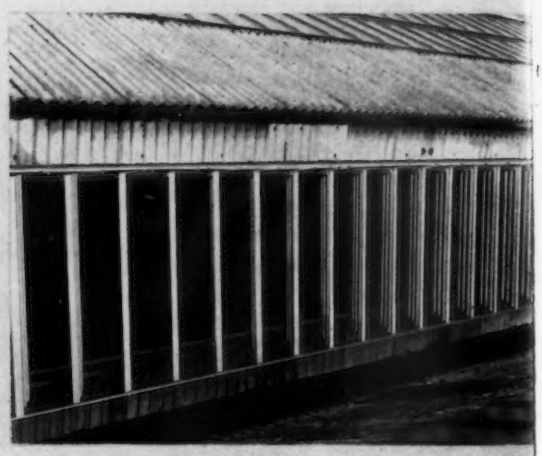
B

Four methods of improved factory ventilation

HILLS ROOF VENTILATING SHUTTERS



HILLS VENTILATING SHUTTERS -VERTICAL WALL APPLICATION

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HILLS Industrial Ventilators are designed to meet every requirement for efficient and economical ventilation in foundries, rolling mills, factories, workshops, etc. They provide positive and rapid extraction of smoke, fumes, steam and overheated air, and admit the fresh air essential to improve working conditions. All types of HILLS Industrial Ventilators are easy to install in new or existing buildings. For expert advice on any problem of industrial ventilation, we invite you to consult our Technical Advisory Department. Illustrated literature is available on request.

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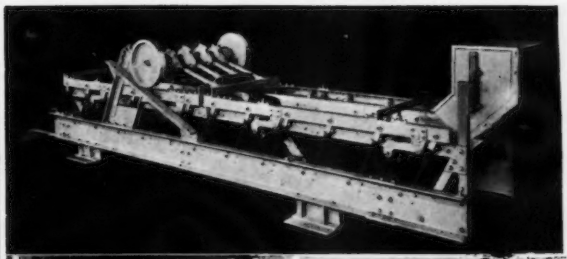

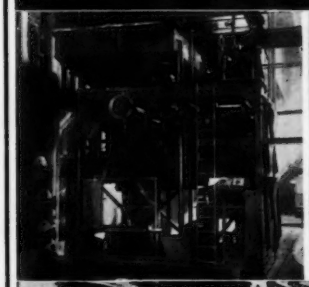

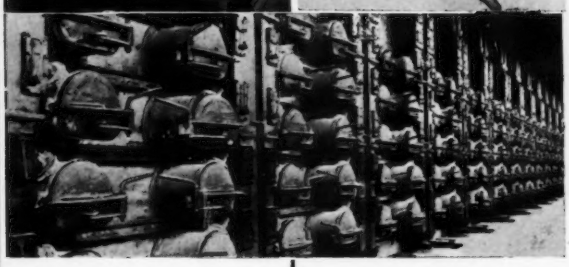

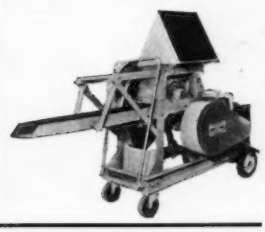

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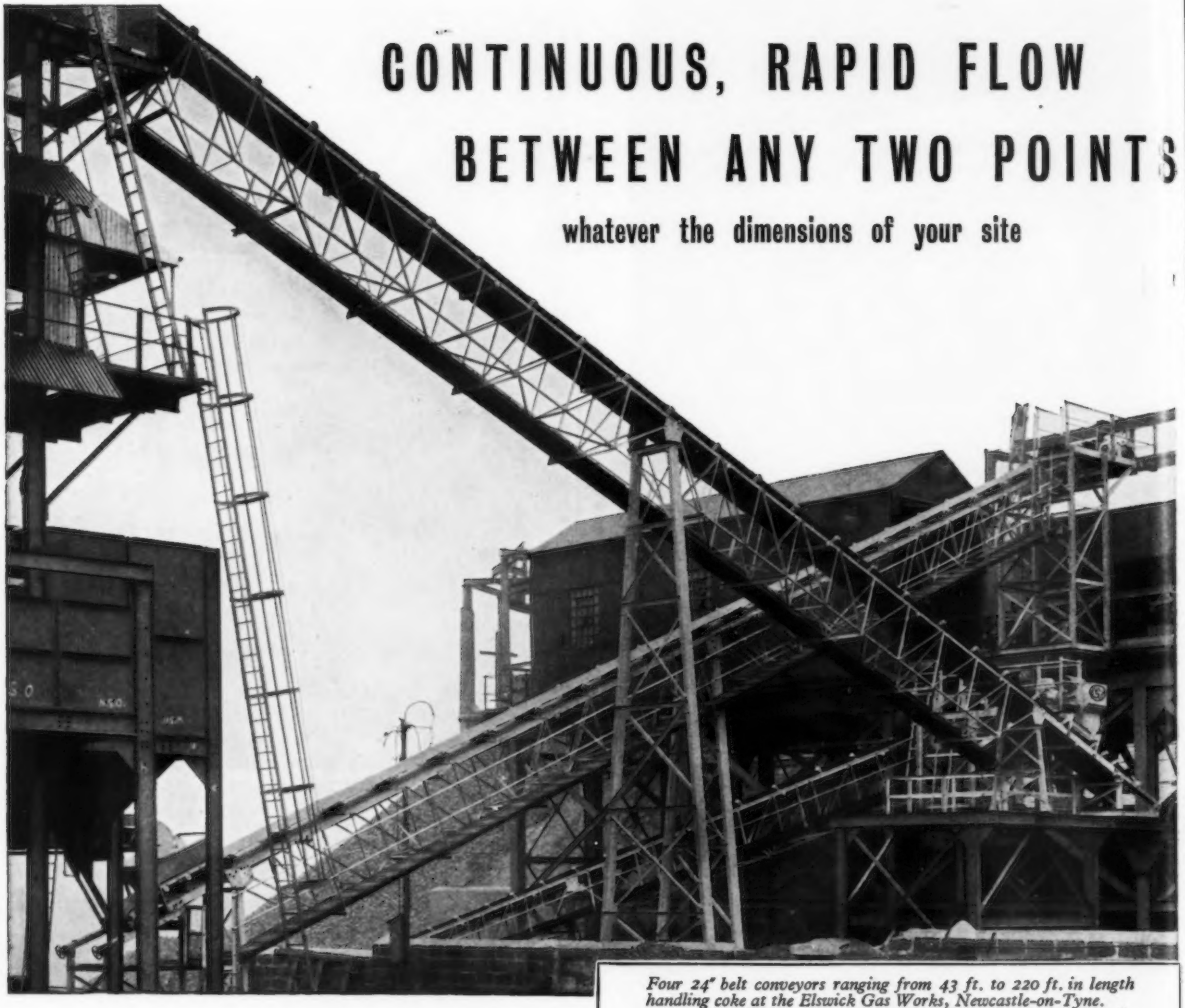

Four 24" belt conveyors ranging from 43 ft. to 220 ft. in length handling coke at the Elswick Gas Works, Newcastle-on-Tyne. (Photograph by courtesy of the Northern Gas Board).

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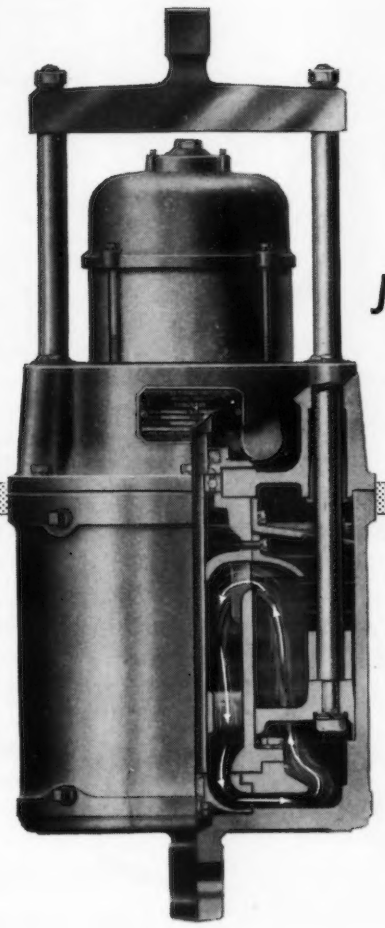

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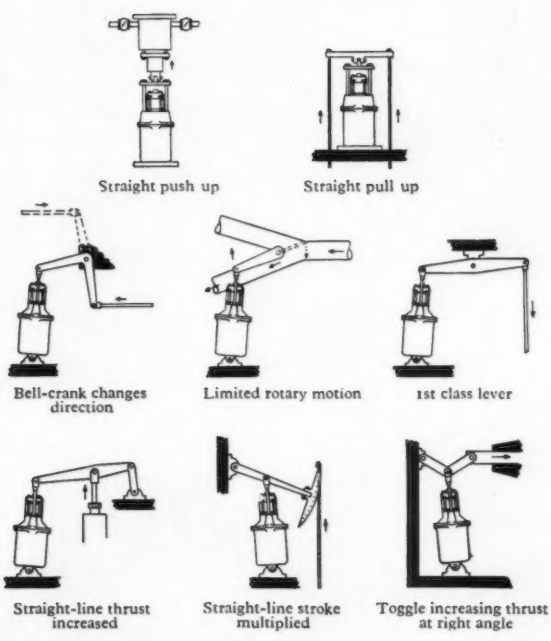

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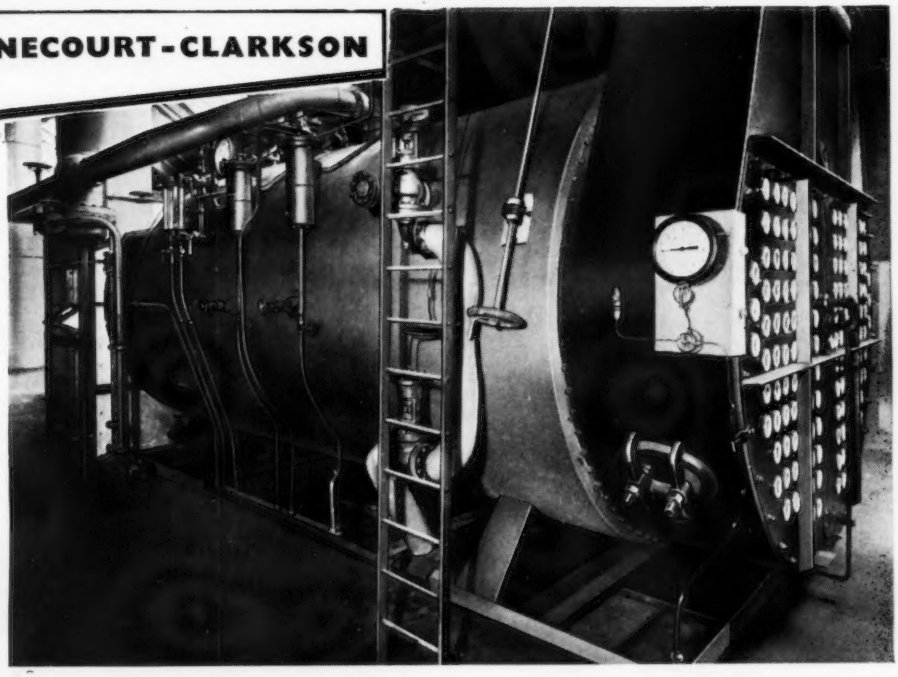

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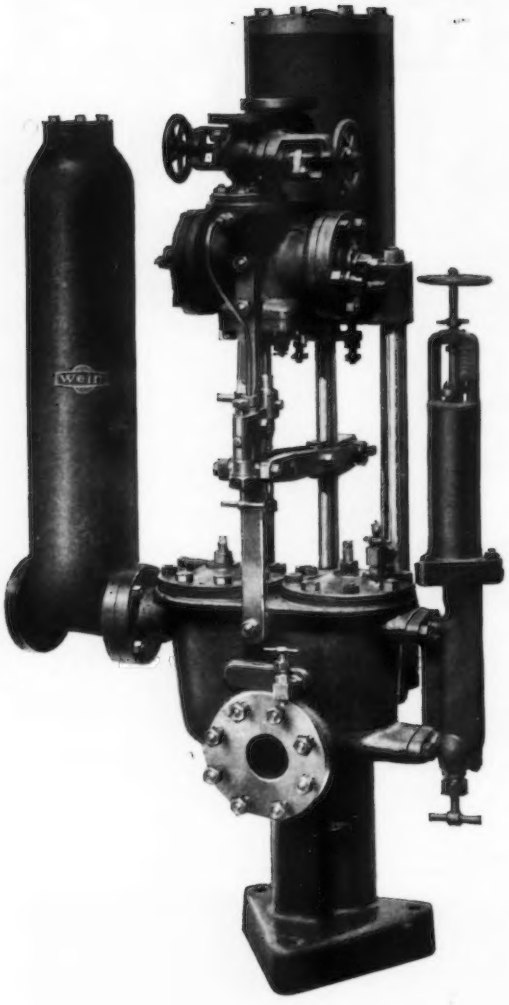

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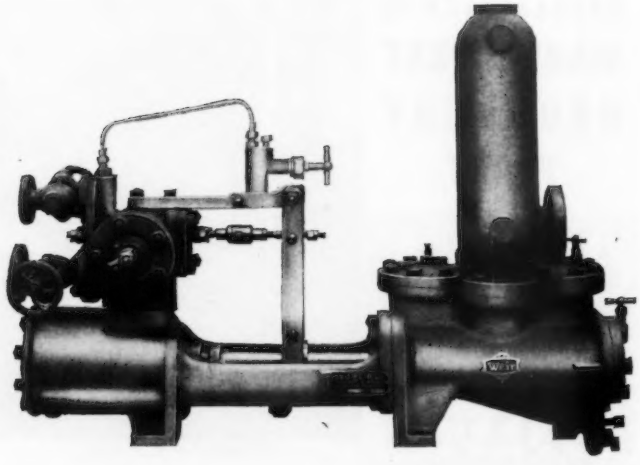

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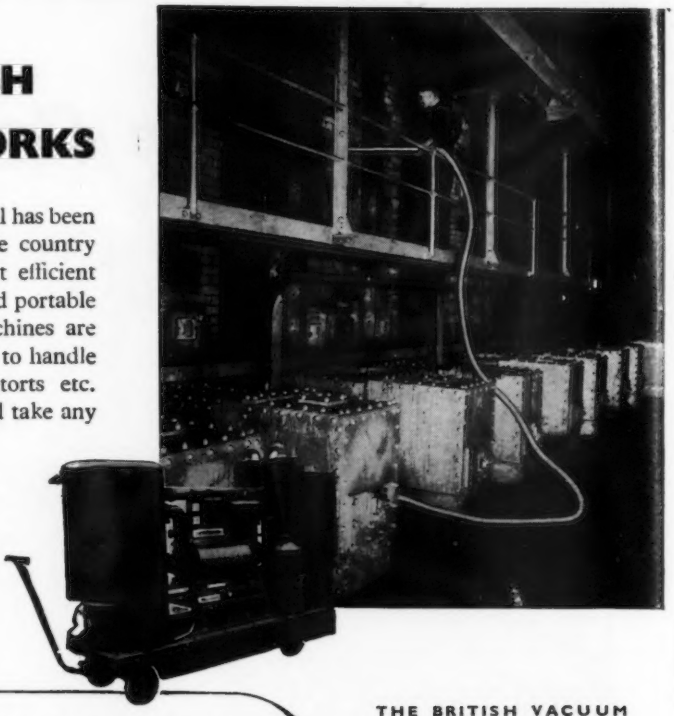

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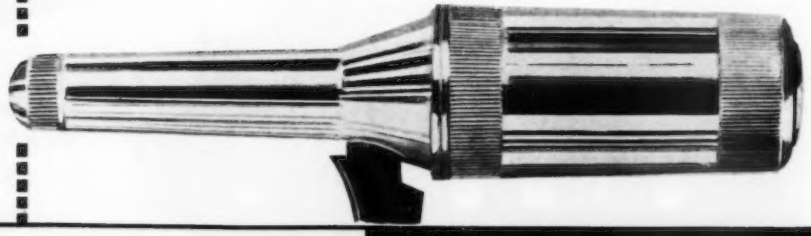

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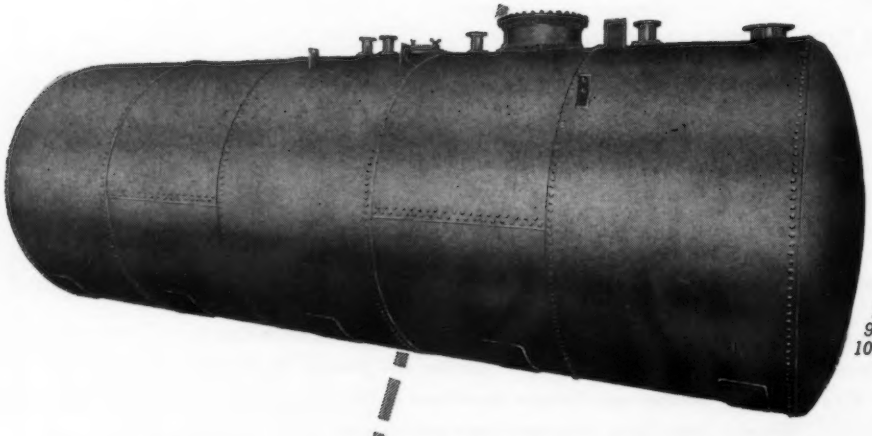

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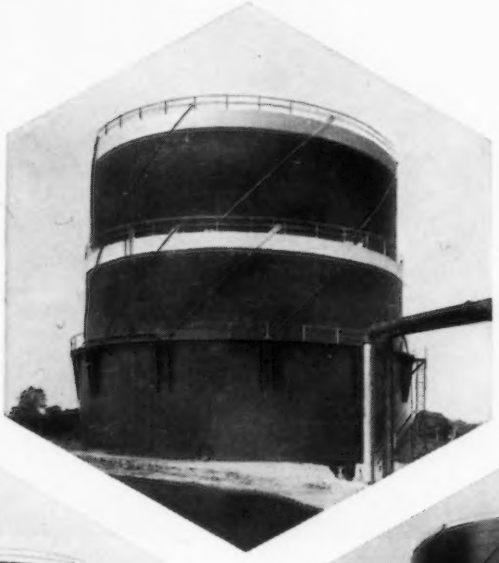

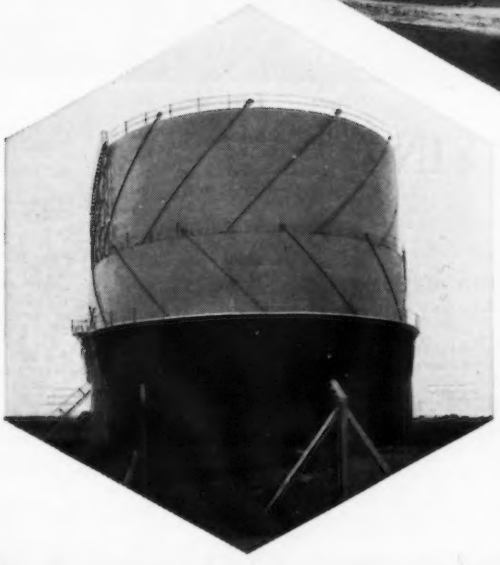

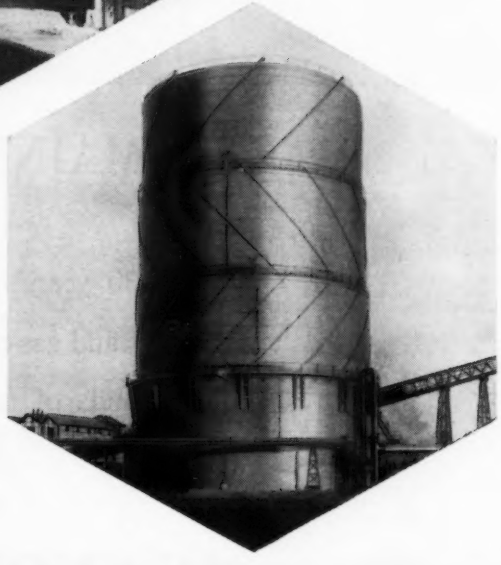

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H&G

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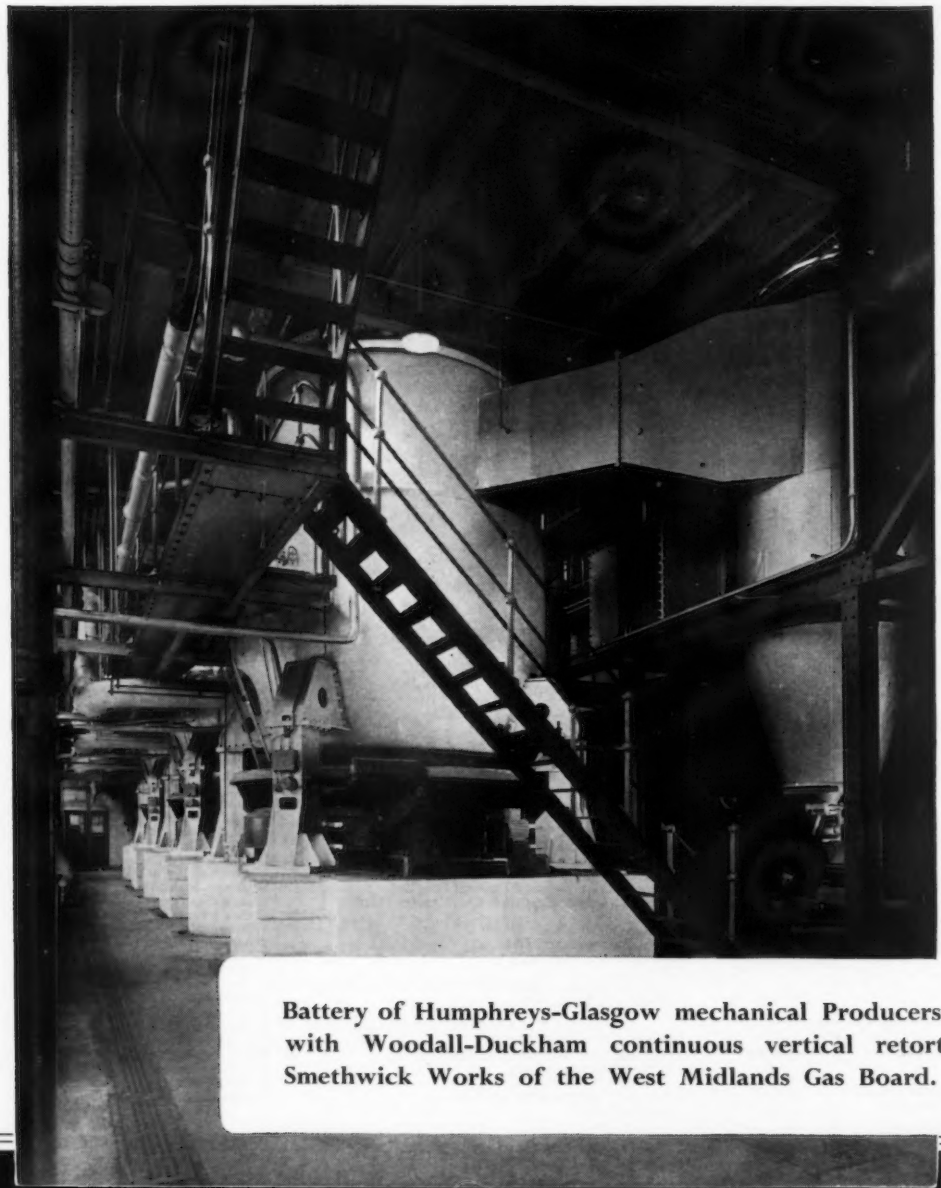

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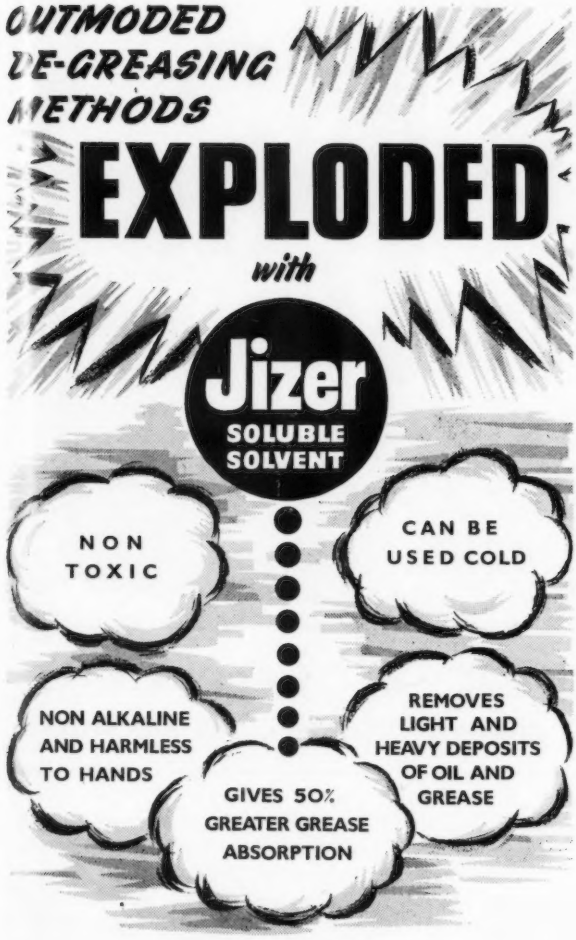

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Gas Journal

VOL. 284 NO. 4819 October 12, 1955

107TH YEAR

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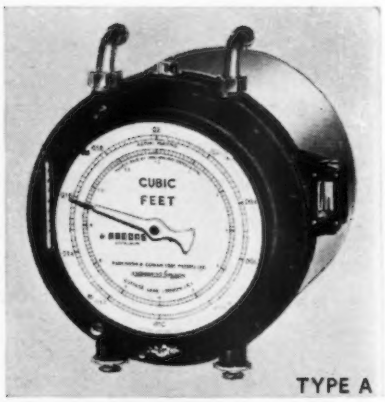

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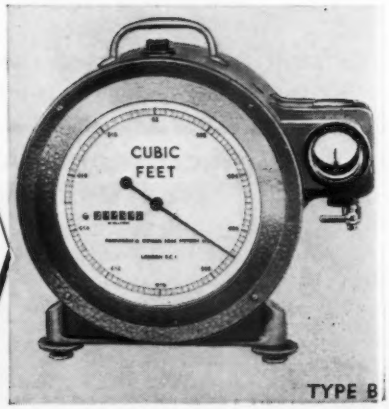

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Gas Journal

OLUME 284. No. 4819. OCTOBER 12, 1955. 107th YEAR

A Damaging Silence

ONE result of the alarming 'comprehensive measures' which are being put into effect by Mr. Butler during the vague period of the Parliamentary recess is that the rank and file of the gas and electricity industries are now uncertain what part they are playing in the Nation's economy. The two industries are to divert £350,000 from advertising to capital schemes in the next six months by means of cutting sales campaigns by 60% to 70%. This is at the request of Mr. Geoffrey Lloyd, Minister of Fuel and Power. Some types of advertising are to be stopped, and others reduced by a third or a half. The object of the cuts is said to be to help curb spending and avoid inflation and to enable the gas and electricity boards to use the money saved for capital works.

One presumes the decision to make the cuts was in consultation with the industries concerned. That being so, would it not be a good idea if the gas boards, the manufacturers and the public were better acquainted with the blue-print of what now appears to be an almost national fuel policy? Until recently the gas industry knew it was doing the right thing in creating a demand for smokeless-fuel appliances. It was missionary work, led by the Good Word of the Beaver Report. Now it is a mere sport, the public are allowed to think, designed to give jobs to fiendish advertising men who are lining their pockets with fantastic sums at the tax-payer's expense. That is the image that exists in the mind of a correspondent to the *Financial Times* who writes: 'The extent to which this rivalry (between gas and electricity boards) has been allowed to run riot at the tax-payer's expense is illustrated by the recent contract between the North Thames and South Eastern Gas Boards and the Associated Broadcasting Company for six or seven monthly television advertising 'spots,' some of them at the rate of £1,000 a minute!'

There are answers to this kind of attitude, but who is going to give them? The gas industry had better use some of its remaining 40 or 30% advertising to let the public know quickly the reason why it has spent money on advertising, and why it is able to cut it down at this particular time without harmful effect. Parliament might be on holiday, at Bournemouth and elsewhere, but the nation, including gas staffs, is mostly back to work, and we all would like to know in which direction to push—or pull.

Meanwhile, the electricity industry adopts a mien, which, for a while, turns our tears to laughter. The *Electrical Times*, throwing up its hands in horror at the South Eastern and North Thames Gas Boards' use of commercial television, says: 'This outflanking movement, however, has left the electrical industry gasping. It is immaterial whether the C.E.A. now feel free to act or whether the onus of replying is considered to fall on area boards within the I.T.A. area, since action is unlikely in this time of soft-pedal publicity. Certainly, so far as we have been able to ascertain, no such step is to be taken, so once again we have to stand on our dignity while the aggressive publicity of gas goes ahead.'

Before we gaze guiltily at the blood on our hands, however, let us turn to other pages of the same issue of the *Electrical Times*. We see that (1) Hoover are using T.V. 'spots' of 90 seconds duration every other Sunday; (2) General Electric are advertising 'from lamps to refrigerators' in 36 short weekday spots; and (3) British Thomson-Houston Co., Ltd., in a series of 30 second advertisements, are depicting 'Lighting in the Home.' As yet there has been no public protest. Neither has much comment been passed on Mr. Gregg's statement at the Ayr Gas Sales and Service conference that compared with the £300,000 spent by the appliance manufacturers each year on consumer publicity in the gas industry, the electrical manufacturers spent £2½ mill. Advertising by the nationalised electricity industry is inferior and lacks enthusiasm—a result of a too-easy time in certain fields of development. Gas advertising is resented because it keeps electricity 'alive.'

Summing up, our belief is that if the advertising and sales campaign cuts are made with nothing to introduce them but newspaper reports of unknown source and Government statements, neither the public nor the industry itself will feel that its tremendous efforts so far have been of any value. Are the Beaver Report recommendations to be shelved for another winter? At this rate even the gas showroom salesman will soon begin to feel a little guilty every time he sells an appliance, lest he has contributed to the downfall of the pound.

A Sign of the Times

TIMES change—and the gas industry, perforce, has to change with them. Rarely has this thought been so clearly brought home to us as at the recent meeting of the Wales and Monmouthshire Section of the Institution of Gas Engineers, where practically the whole of the proceedings, and indeed much of the casual conversation, concerned gas grids and supplies of coke-oven gas. It was evident that gasworks as places of gas manufacture have taken very much of a back seat as far as the senior body of Welsh gas engineers is concerned. This is, perhaps, not surprising when one considers there are now very few gasworks of any size left in Wales and that the bulk of the gas supplies throughout the area comes either from steelworks or the National Coal Board's coking plants. It was significant that the visit arranged to follow the Meeting of the Section was to the Coal Board's coking plant at Nangarw, just outside Cardiff. This plant, which normally feeds some 7½ to 8½ mill. cu.ft. of gas per day into the South Wales grid and can supply up to 12 mill. cu.ft., is of particular interest in that it is said to have been designed, not with the sole purpose of producing metallurgical coke, gas being a by-product, but rather to manufacture coke, and gas for the grid, as products of equal importance. The National Coal Board considers that the gas produced at Nangarw and sold to the Wales Board is a primary product, and no doubt on this basis it demands a keen price. One thing would seem to be quite clear—the Wales Gas Board is very largely in the hands of other industries as far as its main supplies of gas are concerned, and it may well be that gas engineers in this area feel some regret that they have practically lost control over this side of their industry. Today, the distribution engineer reigns supreme in Wales.

During the Chairman's address a reference was made to education, and it was pointed out that very real difficulties arise in the organization of classes in gas engineering because of the great distances between major centres of gas production and the high ratio of small to large undertakings. The District Education Committee has done all it can, endeavouring to arrange classes even where only three or four candidates could be found. Nothing, however, can alter the fact that the sizeable works in Wales, employing a large staff of trained engineers, is almost a thing of the past, while the number of small works is likely to dwindle as the years go by.

TRAINING FOR SUPERVISION

MUCH of the success of some organizations is attributed to the recognition of the need for training supervisors. The Committee of Inquiry on the Training of Supervisors has suggested that the Ministry of Labour's Regional Controllers should help employers in arranging local conferences to discuss supervisory training and encourage its development. This has been followed up, and a number of local conferences or discussion meetings have already been held throughout the country. They have been informal in character. Employers in an area have been able to meet in small groups and have had the opportunity of interchanging information, of discussing various aspects of the problems of training supervisors and of measuring their own practices against those of neighbouring firms. The agendas for the meetings have generally been made up of items which firms have themselves suggested. The status and place of foremen in the management structure, the standards and qualifications required of them, methods of selection and promotion, adopted methods of training (internal and external), and problems encountered are examples of the topics firms were most anxious to discuss.

In a recent leader, *Deep Excuses,* 'GAS JOURNAL,' September 28, we suggested that the most probable cause of the profits made by the Midland areas of the National Coal Board (the only profit-making areas of the N.C.B.) was the good 'industrial relations' situation which began with the Spencer union. We would propose, therefore, that the conferences concerning supervisory training should not be arranged purely by the Ministry of Labour but in association with corresponding trade unions and that the subject of the most urgent consideration should be industrial relations. Earlier, we were thinking only of coal, and we urged that the Board should study the historical background which gave rise to the better industrial relations in the Midlands. Now we extend that suggestion to the whole of industry and to all employers who are taking part in the local conferences. There is a definite link between supervision and industrial relations that should not be overlooked. It might be that as a result of these conferences a way will be found of spreading the 'Spencerian' attitude throughout all industry. If that could be done the country would benefit immensely, its economic foundations would be strengthened, and there would be less selfishness and fewer strikes.

HAPPY HOMES ON TOUR

IT will be remembered that the Gas Council's encyclopaedia of homecraft, *The Happy Home,* formed the focal point of the Council's stand at the Ideal Home Exhibition this year. The title has now been adapted for an interesting travelling exhibition staged by the Gas Council in co-operation with the Good Housekeeping Institute and the *Daily Mail.* Until next June the Happy Homes Exhibition will be on the road visiting towns in England, Scotland and Wales. A start was made at Maidstone last month, and last week the exhibition was stationed in the Town Hall, Wimbledon, for five days. The central feature of the show is 'At Home with Mr. Therm,' a demonstration kitchen where stage and television cookery stars and home service advisers demonstrate easy-to-make recipes. Visiting celebrities include many of the key staff writers on the *Daily Mail,* and Mr. Leslie Hardern, Public Relations Officer of the North Thames Gas Board, who gives his views on cooking and describes inventions which have come into his B.B.C. Inventors' Club embracing new ideas for the kitchen. Bon Viveur (Major and Mrs. Cradock) perform their celebrated 'Kitchen Magic' act, and last week drove to Wimbledon Town Hall in a superb canary yellow 1911 Renault of gargantuan dimensions.

Of the fifty-odd firms exhibiting, six go to make up what is virtually a gas section supporting the Gas Council's own exhibit. These are Ascot Gas Water Heaters, Ltd., Electrolux, Ltd., Sidney Flavel & Co., Ltd., R. & A. Main, Ltd., Radiation Group Sales, Ltd., and Stoves, Ltd. Thus the gas industry is strongly represented. But despite the fact that the British Electrical Development Association is not participating, the fuel interest is not wholly gas, since such concerns as Hoover, Ltd., and Philips Electrical, Ltd., have stands in the exhibition. In general, however, the Happy Homes caravan is an effective vehicle for gas publicity, and its journeying around the country will no doubt act as a stimulus for local area boards' business, as well as upholding the reputation of the industry.

6th International Gas Conference

Mr. C. A. King, Managing Director of the 'GAS JOURNAL' who was a member of the British party attending the conference, continues his report on the proceedings and social events.

CLEVELAND, OHIO, *October 2.*

LAST week we carried our report of the Sixth International Gas Conference to the opening General Session in New York on Tuesday, September 27. Since then a week has flown away and we have reached the closing scenes of a panorama which many of us never expected to see and which will always remain vividly in mind.

Though gaiety, friendship making and 'going places' have formed so large a part of the tour, it is in mind that the prime object of the Conference has been to further the knowledge of gas techniques and to provide mutual assistance in that direction between the members of the International Gas Union. We unhesitatingly state the opinion that that object has been achieved primarily through the various group visits and individual personal contacts, and only secondarily through the business sessions. The writer of these notes has attended each successive International Gas Conference, and leaves this one with the impression that the presentation and discussion of the reports and papers was more perfunctory than before.

Business Sessions

There is, of course, the language difficulty; but most of our friends from Europe have sufficient English to understand the trend of discussion, and an able interpreter, such as M. Touwaide, was nearly always at hand. Perhaps on this occasion discussions were disappointing because the two largest delegations were from the United States and from Great Britain; and whereas the latter were eagerly imbibing knowledge of processes which are bound to leap forward in English practice, the Americans are—quite understandably—inclined to raise an eyebrow at the mention of carbonization.

Be that as it may, the British delegation acquitted themselves nobly indeed in the various sessions; without their ready participation there might well have been but scant recognition of the time and thought devoted by the authors to presenting a technical programme.

In the afternoon of the first day there were contemporaneous sessions on transmission-distribution and gas production; on the following day a further session on production running alongside utilization. Mr. Hutchison took the Chair at both production sessions, The programme allowed half-an-hour for the presentation and discussion of each item. In this and later issues of the 'JOURNAL' we shall publish abstracts of most of the contributions.

Mr. Hendee presided at the closing General Session on Thursday, September 29, when, first, Dr. Haffner admirably introduced the subject of education and training in the gas industry.

A View of World Trade

The final item of agenda was an address by Colonel W. F. Rockwell, Chairman of the great Rockwell Manufacturing Company, entitled 'An American Viewpoint on World Trade.' Much of this dealt with American politics and home affairs, but his closing remarks we found extremely apposite.

He said: 'In the past, the United States has had a high degree of self-sufficiency, but many of our great natural resources have been so reduced by the demands of war that we shall have to send more and more dollars abroad to buy raw materials—some of which, such as tin and rubber, were never available in this country. We have today just two outstanding advantages over other industrial nations: We have low-cost mass production, which cannot be sustained without the other advantage of mass-buying power. In as much as there are 60 million automobiles for our 160 million citizens, it is evident that mass-buying power is not confined to a small part of our population. Neither mass-production nor mass-buying power could have reached its present level if our Constitution had permitted any State in this Union to set up trade barriers against any other State similar to those which bar trade between neighbouring countries in Western Europe, including Great Britain.

'Very few American businessmen, and probably not more than 1% of our government officials, understand the legalized cartel systems which operate in many European industries. There is no question that they offer special protection to employers and employees in cartelized industries, but it is often at the expense of other individual and group interests in the same countries. Such a system is illegal in our country, and, although there is evidence that it has been secretly practiced in certain industries, it cannot be even reasonably successful if any member cannot be punished for violation of the cartel's standards of prices and terms. As our British friends say, cartelization converts competitors into pleasant cooperative associates; but, in our country, there is a prevailing belief that competition is the life of trade, though it may kill off the inferior trader.

'There is no doubt that the present tariff competition among our three leading American manufacturers of motorcars is bruising smaller competitors, but the buying public is benefited by most attractive bargain prices. As a result of this keen competition, each motorcar manufacturer must struggle to raise his efficiency and reduce his labour and material costs. Out of this conflict has come a new word, "automation," which symbolizes the process of mechanization and motorization, which gives the worker the power to produce more, *plus* the new electronic controls, which automatically eliminate some human errors. The charge that automation will create unemployment is offset by the fact that 50% of the American workers today are producing goods and services which were unavailable or unattainable just half-a-century ago. It is most unlikely that such progress would have been possible if it had not been spurred by intensive competition, which, in its spirit, is the very antithesis of socialism and nationalization of industry. Scientific advances in agriculture and industry have been greater in the last half-century than in the preceding twenty centuries, in spite of two disastrous global wars which destroyed a considerable part of the inherited man-made goods accumulated by generations of our forefathers.

'If we, who are engaged in the production of goods and services, are permitted to pursue our peacetime progress and can persuade our political leaders to accept the fact that the whole world has more to gain from the universal practice of private enterprise than from any partisan struggle for political power, we may look for a new era of permanent peace and spreading prosperity; it is even possible that we shall eventually see the fulfilment of the Biblical prophecy that "The meek shall inherit the earth".'

The Brooklyn Union Company

Further exemplifying the hospitality of our hosts, as enjoyed in Topton and Philadelphia, the Consolidated Edison Company provided lunch for all the delegates after the business session on the Wednesday; and there were visits afterwards either to the showrooms of the Brooklyn Union Gas Company or to the gasworks at Greenpoint. At the latter the main interest of the British party centred on a tiny corner of the area where natural gas, having forced its way over the last river and crossed a large part of the Metropolis, is dropped finally to mixing pressure.

Public Service Gas and Electric Company

Friday, September 30, was devoted to a 'field trip' to the Harrison (New Jersey) Works of the Public Service Electric and Gas Company. The latter, of which Donald C. Luce is President, operate a number of undertakings in what is claimed to be the 'Crossroads of the East' New Jersey.

The Harrison Works, built in 1926, provide the base load plant of the inter-connected gas plants that supply northern New Jersey; other plants being located in Jersey City and Paterson. The Harrison Works rank as one of the largest and most efficient in the country, with an average daily output of 90 mill. cu.ft. and a peak capacity of 286.5 mill. cu.ft.

The final product at Harrison is a mixed gas composed of carburetted water gas, thermal reformed natural blue gas, catalytic reformed natural gas, straight natural gas, modified

(*Concluded on p.* 130.)

Personal Notes

MR. T. HESLOP and MR. M. J. NOONE have been appointed to the Board of Directors of Whessoe, Ltd. They will continue to hold their present managerial posts.

MR. JOHN V. SHEFFIELD, Deputy Chairman of Horseley Bridge and Thomas Piggott, Limited, has been elected Chairman. He succeeds the Earl of Dudley who has retired as Chairman but remains a Director of the Company.

MR. ERIC BELLINGHAM is to relinquish his post as Director General of the Coal Utilization Council to take up an appointment with Radiation Group Sales, Ltd., as General Manager of their Solid Fuel Sales Division.

MR. G. E. GAMBLE, a director of William Whitehouse and Co., Ltd., has retired at the age of 81. He entered the service of the Company at the age of 21 as a junior clerk and was eventually made a director in 1947.

MR. JAMES TITLEY has been appointed Midlands Area Manager of C. H. Johnson (Machinery), Ltd., Stockport. Mr. Titley at present operates from his home address at 'Glenariff,' Byrd Lane, Uttoxeter (T/N Uttoxeter 2389), but it is hoped to open a Midlands sales and service depôt in the near future.

MR. T. B. SCOTT, an Assistant Secretary of the Gas Council and formerly Secretary of the British Gas Council, has been appointed Chairman of the professional membership committee of the Institute of Industrial Administration. The Institute, founded in 1920, has been incorporated as the professional wing of the British Institute of Management.

MR. J. LUSTED, Engineer and Manager of Strabane (Co. Tyrone) Urban Council's gas undertaking, was elected President for 1955 to 1956 of the Irish Gas Asociation at its annual meeting in Cork. MR. G. MCDOUGALL, Londonderry, was elected Vice-President. MESSRS. J. W. YOUNG, ROBINS, F. S. CLEGG and G. WALMSLEY were elected to the Committee as Northern area representatives.

MR. W. KENNETH G. ALLEN has been elected Chairman of W. H. Allen, Sons & Co., Ltd., Bedford, in succession to his uncle, the late Sir Richard W. Allen, C.B.E., D.L. He joined the Board in 1937, becoming a Managing Director in 1946, and is the third member of the Allen family to become Chairman of the Company since it was founded by his grandfather, Mr. W. H. Allen, in 1880. Mr. Kenneth Allen is also a Director of Whessoe, Ltd., Darlington, and has many other interests, not only connected with the social and recreational sides of his own Company, but also with the town and county of Bedford. Until recently he was a member of the Bedfordshire County Council, on which he served for 12 years, and during part of this period was Chairman of the Local Government Committee.

MR. NOEL S. SMITH, Area Development Manager, South Western Gas Board, is to retire after completing 50 years' service in the gas industry.

Mr. Smith retires on December 31 and he will serve the Board in an advisory capacity for three months until that date. As a result of this retirement, the Board have made the following appointments: MR. T. N. DENT, Engineer and Manager of the Bristol and Bath Division, has been appointed Area Development Manager, and MR. T. W. JACKSON, at present the Engineer and Manager of the Weston-super-Mare and Taunton Division, has been appointed Engineer and Manager of the Bristol and Bath Division, both appointments to take effect from October 1. MR. J. D. BUTLER, Engineer and Manager of the Cheltenham District, has been appointed Engineer and Manager of the Weston-super-Mare and Taunton Division. MR. F. L. WHITEHURST, Engineer and Manager of the Yeovil District, has been appointed Engineer and Manager of the Cheltenham District. MR. T. PORTER, Assistant Engineer and Manager of the Forest of Dean District, has been appointed Engineer and Manager of the Yeovil District. The three latter appointments take effect from November 1.

MR. T. E. TYRRELL, Sales Superintendent of the Cardiff Undertaking of the Wales Gas Board, was today appointed Domestic Sales and Service Officer for South and Central Wales. Mr. Tyrrell is 42, married with two children. He was educated at Cardiff Technical College and is an Associate of the Institution of Gas Engineers as well as an Associated Member of the Incorporated Sales Managers' Association. In World War II, Mr. Tyrrell served in the Royal Air Force until invalided out in 1943. Prior to appointment as Sales Superintendent, Cardiff, in 1951, he was Sales Superintendent at Port Talbot Undertaking. Apart from numerous committees upon which he already represents the Board, Mr. Tyrrell has taken a keen interest in local educational activities and is a member of the Board of Governors of Llandaff Technical College and has been a Lecturer and Examiner in Gas Fitting of the City and Guilds Examinations.

Obituary

MR. GEORGE P. MITCHELL, who retired in 1949 after 40 years service with the gas industry, died on October 5. From 1904 to 1910 he served with Bertrams, Ltd., Edinburgh, and Barrowfields Ironworks, Ltd., Glasgow. In the latter year he was appointed Chief Assistant to the Engineer and Manager of the Gas and Electricity Departments at Alloa, and two years later took up a similar position with the Dundee Gas Department. He was later appointed Engineer and Manager of the Port Glasgow Gas Department and was in charge of the Falkirk Gas Department from 1918 to 1919. From then until 1933 he was Engineer and Manager at Blackburn before his appointment as Engineer and General Manager of the Worcester New Gas Light Company. He became Managing Director and Chief Engineer of the Company in 1938 and held the post until his retirement. During his 16 years at Worcester he completely reorganized the gasworks and installed modern plant which almost trebled the output of gas. The name of Mitchell was well known in the industry: Mr. Mitchell's father, the late Mr. Robert Mitchell, was Engineer and Manager of the Edinburgh Commissioners and his brother, the late Mr. James Mitchell, was Engineer and General Manager of the Leicester Corporation Gas Department. Mr. Mitchell was a member of the Institution of Civil Engineers and of the Institution of Mechanical Engineers, and a member and Council member of the Institution of Gas Engineers. In 1946 he was the President of the Midland Association of Gas Engineers and Managers. He was also a President of the Waverley Association of Gas Managers and Chairman of the Bristol and District Tar Board.

MR. CHARLES STUART ROSE died on September 20, in his 70th year. Mr. Rose joined Radiation, Ltd., in 1921 as Advertising Manager, which position he held until his early retirement owing to ill-health, in December, 1946.

Diary

October 14.—LONDON AND SOUTHERN JUNIORS: Presidential Address, N. R. Junkison, Edgware Road, 6.30 p.m.

October 14.—MIDLAND SECTION, I.G.E.: Autumn Meeting, Palace Hotel, Buxton. 11.0 a.m. Paper by H. Oliver and K. Carr: 'Some Observations on Refractories for Gas Retorts.'

October 18.—LONDON AND SOUTHERN SECTION, I.G.E.: Annual General Meeting, Pepys House, 14, Rochester Row, S.W.1, 2.30 p.m.

October 19.—LONDON AND COUNTIES COKE SALES CIRCLE: Visit to Beckton gasworks.

October 19.—SOUTH WESTERN SECTION, I.G.E.: Annual General Meeting, Swindon.

October 25.—EASTERN G.C.C.: Connaught Rooms, Great Queen Street, W.C.2, 11 a.m.

November 4.—SCOTTISH JUNIORS (WESTERN): 'The Accountant in the Gas Industry.' Gas Showrooms, 522 Sauchiehall Street, Glasgow, C.2 6 p.m.

November 9.—INSTITUTE OF FUEL LONDON: 'Chimneys and the Dispersal of Smoke,' J. E. Hawkins and G. Nonhebel. 5 p.m. Institution of Civil Engineers, Great George Street, S.W.1

6th INTERNATIONAL GAS CONFERENCE PAPER

The Pre-treatment of Coal before Carbonization

By Dr. A. Parker (Great Britain)

WITH the shortage of gas coals and coking coals in many areas, it is necessary to use coals of other types in place of or to supplement, high-grade coking coals. Pre-treatment of the coals is often necessary, by such methods as coal cleaning, drying, oxidation, preheating, size-grading and grinding, blending and briquetting.

Suitability for Carbonziation

The best quality gas-coals are those of strongly-caking properties which contain 30 to 40% volatile matter and which give on carbonization high thermal yields of gas. Coals of lower caking power and of higher volatile matter content are used, however, to a considerable extent for coal-gas production and it seems probable that, owing to the relative shortage of the better gas-coals, it will become necessary to use them to an increasing extent in the future. Their use either in retorts of the static or continuous vertical types in place of the higher grade coals will produce lower thermal yields of gas per ton of coal carbonized, gas of calorific value 35 to 40 B.Th.U. per cu.ft. lower, and a decrease of coke yield of about 2½ cwt. per ton of coal with increase of breeze of about 0.3 cwt. per ton.

An advantage of the use in carbonization of such lower rank coals in Great Britain and other countries where both gas and coke suitable for use in domestic heating appliances are required is that the coke produced is of higher combustibility than that obtained from normal gas-coal. The carbonization of carefully graded nut sizes of these coals, either with normal gasworks conditions or with the flue temperatures somewhat reduced and/or the carbonizing period shortened will produce highly reactive coke which gives a good performance even in the older types of domestic open grate used in Great Britain. Although the gas yield per ton is reduced, the plant output may be higher due to the higher throughput possible with such coals. The production of a smokeless reactive coke of this type would allow of the replacement of some of the bituminous coal normally used in domestic appliances and would assist in reducing atmospheric pollution by smoke.

In the coking industry the first consideration is the production of strong coke suitable for use in blast-furnaces or foundries. The types of coal which give the best quality coke are those of strongly-caking properties with volatile matter contents of 20 to 30%. The supplies of such coals, however, are insufficient to meet requirements, and much use is made in the industry of lower-rank coals. The properties of coke produced from the latter types of coal can often be improved by blending them with a proportion of good coking coal or by additions of coke, semi-coke, pitch and other materials.

Much attention has been given throughout the world to the problem of producing hard coke from non-coking coals. A method commonly adopted is to briquette the coal with or without a suitable binder, and to carbonize the briquettes. Pre-oxidation or pre-heating of the coal may be necessary to modify its behaviour.

Processes of low-temperature carbonization which aim generally at the production of reactive coke and high yields of liquid products generally require medium or weakly-caking coals. Where available coals have unsuitable properties for the process, the caking power may be modified by preliminary treatment, as for example in the Disco process where the coal receives a preliminary roasting.

Cleaning

Coal as mined comprises a mixture of sizes varying from large lumps down to the finest dust. It includes not only any dirt bands which occur within the seams, but also dirt and shale unavoidably collected from roof and floor measures in the process of mining. The shale itself may vary in combustible matter from below 10 up to about 60%.

In general the various stages of removal of mineral matter comprise selection at the coal face, hand picking of the larger sizes, wet-washing or dry-cleaning of the smaller sizes, and often froth flotation of the finest size material. A factor influencing cleaning operations has been the introduction of wet-cutting, wet-spraying and water infusion methods for dust suppression to minimize the incidence of pneumoconiosis in miners. The higher moisture content of the fine coal, resulting from these practices, makes dry methods of cleaning less efficient and more difficult to apply, with the result that such methods are tending to give way to wet-washing processes and to the increased use of froth flotation for the cleaning of the very small size, below about 1 mm.

Increase of wet-washing and froth flotation methods and the decline in dry-cleaning processes in Great Britain are shown by the following data for the percentages of the total output of deep-mined coal mechanically cleaned in 1938 and 1952. In addition, 27.5% of output in 1954 was hand-cleaned.

	1938 %	1952 %
Wet washed	38.3	46.6
Dry cleaned	7.0	5.6
Froth flotation	0.1	0.8
Total	45.4	53.0

An interesting method of utilizing the phenols in waste ammonia liquor, in place of the normal frothing agents in the froth flotation of fine coal, has been applied at a coking plant in Durham. The process reduces the phenol content of the liquor and eases the liquor effluent problem by making easier subsequent chemical or biological methods of treating the liquor before disposal.

The development of the Convertol process in Germany and elsewhere is of interest in the cleaning of fine coal for coking. Heavy oil is dispersed over the surface of the coal particles of a thickened slurry, followed by a centrifugal screening operation. The oiled coal particles have sufficient cohesion to bridge the 0.2-0.3 mm. perforations in the centrifuge screen and are retained in the machine, while the refuse and clay not wetted by the oil remain dispersed in the water and pass out in the effluent. The cleaned coal has a surface moisture content of only 8-10%. It is claimed that oil retained on the coal surface improves its caking power, increases yields of gas and tar on coking, and reduces the amount of binder required if the coal is to be briquetted. Oil to the extent of 3-10% of the weight of dry coal in the slurry appears to be necessary in this process, depending on the type of coal cleaned.

The presence of moisture and ash in coal carbonized reduces the throughput of coal substance and the yield of by-products. Dr. J. Burns records a loss of gas of 4 therms per ton of coal resulting from increase of inerts in the coal of about 3%, while it has been stated that the carbonization of coal of 4% as compared with 18% ash gave an increase of 20% in gaseous therms per ton, and an increase in tar yield from 12.5 to 18 gal. per ton.

Ideally, the ash content of coke for blast furnace use should not exceed about 10% which means that the coal should be cleaned to 7-7½% ash. Shale particles above a certain size tend to cause fracture and reduce the strength of metallurgical coke, while the presence of ash in blast-furnace coke has been estimated to increase coke consumption in the furnace by 2 to 6% for each 1% increase of ash.

Low ash content is desirable in coal for gas production, not merely to improve efficiency in the carbonization process and to keep breeze formation to a minimum, but also because much of the coke is used in domestic appliances operating at low rates of combustion. The performance of such small appliances is sensitive to ash, which also has a high nuisance effect.

For coke to be used in open grates the nature of the ash is important; it is noteworthy that the housewife will tolerate a higher proportion of a dark-coloured dense ash than of a light-coloured fluffy ash which tends to blow about the room.

Sulphur should be removed as far as possible in the coal cleaning processes, but sulphur removal is not always easy, and with some coals little reduction of sulphur content is possible. High sulphur in blast furnace coke entails coke and lime consumption in the furnace to keep sulphur out of the iron, while in domestic and other uses of coke by combustion it constitutes a serious source of atmospheric pollution.

The moisture content of coking slack charged to a coke oven has a marked effect on the bulk density of the charge. As bulk density affects the properties of the coke produced and the swelling pressure of the charge during coking, it is important that the moisture content should be carefully controlled. The bulk density of coal of given size distribution is at a minimum with somewhere between 4 and 10% moisture according to the proportion of fines present. Reduction of moisture below 2 or 3%, by increasing the bulk density, may cause dangerous swelling pressure to be developed by some coals, and may cause difficulties in operation due to sudden evolution of dust-laden gas on charging, with associated damage to oven ends.

Reduction of moisture below a certain critical value does not appear to result in a decrease of the fuel gas required to heat the ovens. German workers conclude that this critical value is about 8%, a value which finds confirmation in the investigations of the British Coke Research Association.

Various methods may be employed for dewatering or drying coal. These include jigging and dewatering screens, bunker or drainage tower drying, mechanical methods such as centrifuges, and thermal dryers. For economic reasons thermal drying of coking coal has been little practised in Great Britain, but in some other countries, *e.g.*, U.S.A., where long distance hauls entail high freight charges, or where severe winter conditions cause difficulties due to frozen wet coal, thermal drying is practised on a wider scale. Where coke is produced from young, very high moisture coals, *e.g.*, from German brown coal, the coal is thermally dried to a moisture content in the region of 10 to 15% before briquetting.

Mild oxidation of coal in air at low temperatures reduces its caking and plastic properties. The amount of oxygen absorbed and the effect on the coal properties vary with the type of coal and are generally somewhat greater with weakly-caking than with strongly-caking types. Provided the oxidation is not carried beyond a certain critical amount, generally small, the oxidized coals when carbonized produce cokes of improved hardness and of more uniform cell structure. The coke, particularly from some oxidized high-volatile coals, may be of improved combustibility. The yields of gas and coke are slightly increased, and that of the tar slightly decreased by such mild oxidation. As the additional gas is mainly carbon dioxide, the gas produced is of slightly higher density and of lower calorific value than that from the untreated coal. Pre-heating, without air, to temperatures of up to about 400°C., of certain weakly-caking high-volatile coals causes reduction of fluidity over the plastic range and increases of the fusion point; it also causes loss of volatile matter, mainly oxides of carbon and water. The caking power of weakly-caking coals can be increased by rapid heating of the finely ground coal to a temperature just below the softening point.

Pre-treatment of coals by oxidation or pre-heating has not been widely used in the carbonization industries, but has been effectively applied in the Bruay and Disco processes or producing reactive domestic coke, and in France for the improvement of the quality of metallurgical coke. Pre-heating of coal for carbonization should increase oven capacity by its effects on moisture content and bulk density of the coal, improve the economy of the carbonization process, reduce the volume of liquor produced, and improve coke structure and strength, without affecting significantly the the yields of coke, gas and tar.

Size-Grading and Grinding

In the carbonization of coal for gas manufacture, the size of coal which gives the best overall results depends upon the type of retorting plant. Where the charge is static, as in horizontal retorts or coke-ovens, small coal can be used provided it has sufficient caking power to give a high proportion of lump coke. In continuous vertical retorts the highest throughput and greatest case of operation are obtained with medium-caking closely graded coal of about nut size, but modern retorts will deal well with strongly-caking run-of-mine coal at a somewhat reduced throughput, provided the proportion of smalls is not excessive. The effects on the yields of products obtained in both types of systems when carbonizing different types of coals have been shown in work at the Fuel Research Station, London. In general, the use of small coal below ¾ in. as compared with graded coal produces a small increase in coke yield, gas of a higher calorific value, and lower tar yield. The thermal output of gas per ton is little affected in static charges, but in continuous vertical retorts is decreased with strongly-caking and increased with weakly-caking coal.

In coke oven practice for the production of metallurgical coke the coal is generally crushed finely, all below ¼ in. with 80% below ⅛ in. being usual. Practice varies somewhat in different districts, the range being from 40 to 70% below ¼ in. in Yorkshire, and 70 to 100% in South Wales, while in Scotland, Durham and Nottinghamshire a somewhat wider range is used. Increase of the proportion below ⅛ in. is beneficial in increasing the strength of coke produced, fine crushing being particularly important for poorly-coking coal.

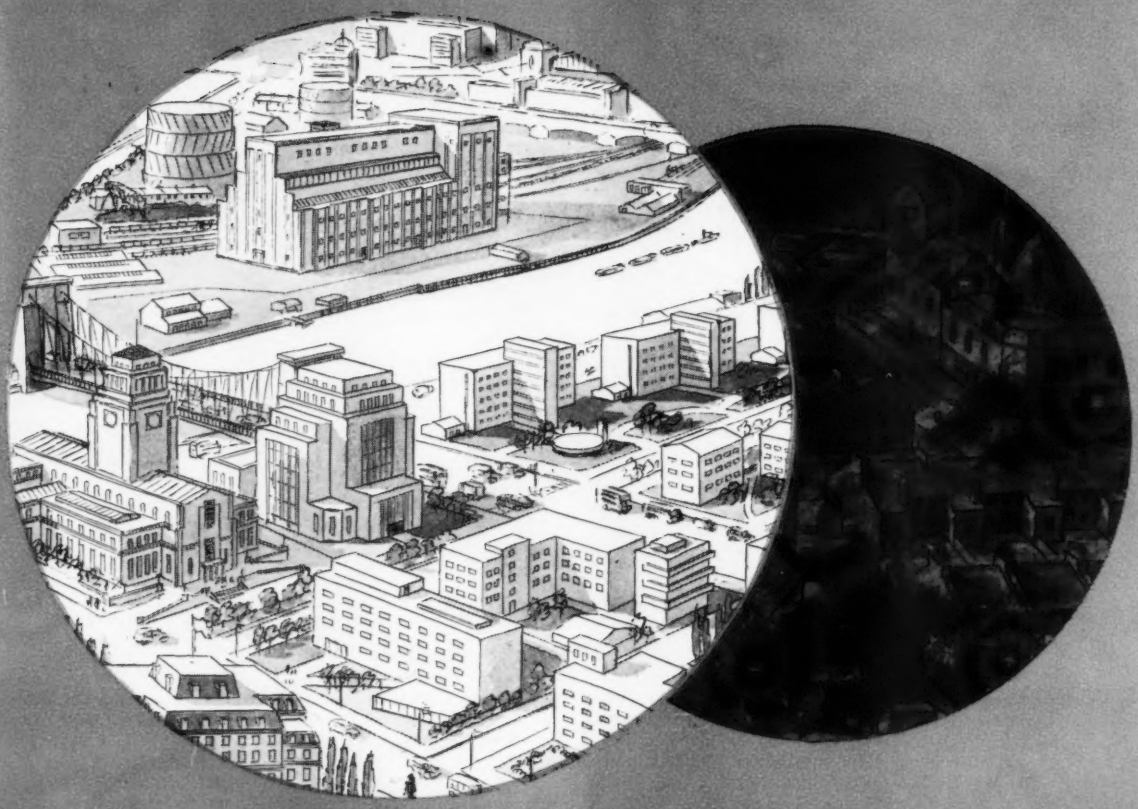
In a banded bituminous coal the bright coal has stronger coking properties than the dull coal, fusain being non-caking. Petrographic enrichment by selective crushing and screening is an attractive possibility for improving the quality of coke produced from coals of only moderate coking properties.

Blending

Blends may contain good coking-coal, poor—or non-coking coal, inerts such as coke breeze, low-volatile coals, anthracites, semi-cokes, pitch, or oil, and while the reasons for the adoption of blending differ at different plants, they are generally one or more of the following: (1) To improve the structure and physical properties of the coke, (2) to control undesirable constituents such as sulphur, ash, and phosphorus, (3) to utilize inferior coking coals or inerts, (4) to control coking pressure, (5) to control yields of products. Where domestic, rather than metallurgical, coke is required the reason may be to improve combustibility of the coke. All new coking installations of the N.C.B. will be equipped with facilities for the blending of coals. The British Coke Research Association has suggested that blending plants should be designed on the following basic sequence: Railway siding accommodation, wagon emptying gear, receiving hopper with automatic belt feeder, preliminary breaker, blending bunkers, final crusher, mixer, and finally service bunker distributor. The work of the Fuel Research Station has indicated that up to 50% of weakly-caking Northumberland coal can be blended with Durham coking-coal to produce coke of 2/1½ in. with shatter indices of 80/90.

Coke breeze as an addition to the coking charge is common practice at many plants. Added in quantities of up to 5% of finely ground material, through 1/60 in., its general effect is to increase the size and strength of the coke, but it may increase slightly the abradability. Such fine grinding of the coke is desirable in blends with poor coking-coals, but with good coking-coals somewhat coarser breeze, 95% through 1/20 in. and 60% through 1/60 in. gives satisfactory results. Its use has the disadvantage that it contributes nothing to the yields of by-products, but with some coals addition of breeze may, by modifying plastic layer formation during coking, promote increased rate of coking. Work of British Coke Research Association on the use of coke breeze with British coals and blends has shown that the swelling pressure of the charge during coking decreases with increasing additions of breeze, though the effect is not very pronounced with additions of less than 9%.

Semi-coke added to coking coal has somewhat similar effects to high-temperature coke breeze in modifying the fluidity of coal during carbonization. Its use in proportions of up to about 15% has been found beneficial on the strength and quality of coke produced from high-volatile Lorraine coals. Experiments at the Fuel Research Station, London, on the carbonization of different types of coals with semi-cokes has indicated that the greatest improvement in coke strength results when the semi-coke contains about 15% volatile matter. Tests by the Colorado Fuel and Iron Co. on the use of blends of 90% high-volatile coal with 20% low-temperature char of



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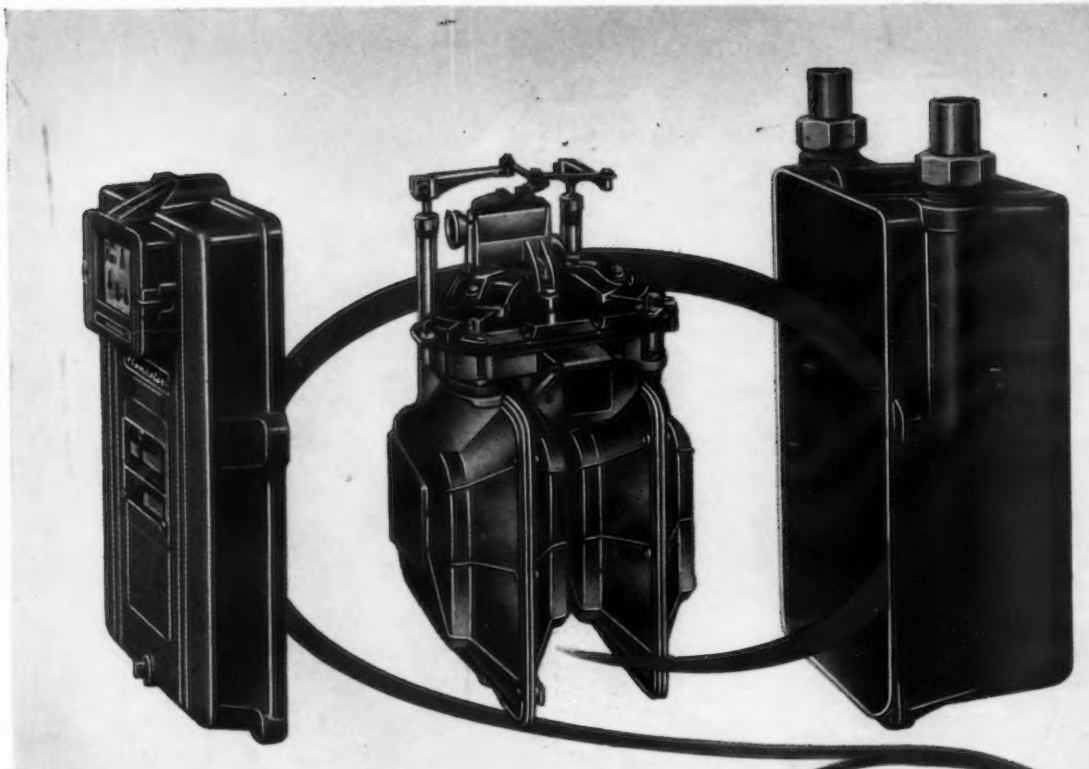

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8% volatile matter, as a replacement of low-volatile coal, gave coke of improved physical characteristics which was used satisfactorily in blast furnaces. Other tests at the Kaiser Steel Co. plant in California with blends of poorly-coking Utah coal with 15% Disco semi-coke showed that semi-coke of 16 to 17% volatile matter gave the best results.

Use of anthracite as a blend constituent is practised to a considerable extent in American coking installations. The addition to the charge of up to about 10% has effects similar to those of coke breeze. The general effects are to increase the size and shatter strength of the coke, but it also increases the friability of the coke and thus the amount of breeze produced. Increase in the 2 in. shatter index of from 85 to 95 by addition of 10% anthracite fines has been reported. Additions of over 10% affect the size distribution and physical properties of the coke adversely, the maximum increase of strength being with 10% additions. Decrease in by-product yields per ton is offset by faster coking rate and thus higher throughputs.

Where low-volatile coals, which give dangerous swelling pressure, are used in blends with high-volatile coals, the substitution of anthracite for part of the low-volatile coal relieves excess pressures on the oven.

The addition of small proportions of oil to coal for coking has been shown to have marked beneficial effects. Additions of 0.2 to 0.5 gal. of heavy oil per ton of coal reduce variations in the bulk density of the charge caused by variations in moisture content and give a general increase of bulk density over the 3 to 8% moisture range. The overall result is an increase of coal throughput, due to increased bulk density, and a decrease of coking time due to greater uniformity of the charge. Additions of 1% of oil (about 2.5 gal. per ton) produce substantial increase of gas yield and increase the calorific value, but higher additions have been found to cause difficulties due to deposits and stoppage in gas offtakes. At two coking plants in Durham, on account of the high cost involved, additions of oil as high as 1% are used only when quantity of gas produced is a governing factor. At these plants an additional 7 mill. cu.ft. of gas per week was made available by this practice.

Pitch has high agglutinating value and can be used in small percentages in blending with benefit with poorly-coking coals. Its use promotes greater fluidity in the plastic zone and gives improved coke quality. It is regularly used in proportions of 1.5 to 4% at some coking plants in the U.S.A. in blends of poorly-coking Utah coal with low-volatile coal. Used in excessive amounts, pitch leads to frothing and may cause trouble due to undue emission of flame on charging, and to deposits in gas offtakes.

The regular blending of coals of different types or of gas-coal with diluents such as coke breeze or semi-coke is not ordinarily practised in the gas industry in Great Britain, but it may become necessary with increasing shortage of good gas-coals and with the introduction of coke-ovens in place of gas retorts. Some gasworks have at times carbonized blends of the gas-coal normally used with weakly-caking coals or with coke breeze with the primary aim of producing coke of higher combustibility for domestic use. Results are reported of carbonization in horizontal gas retorts of blends of gas-coal of size 1 to ½ in. with washed non-caking coal of size mainly below ½ in. in equal proportions. The coke showed marked improvement in combustibility, but the yield was somewhat lower, and the production of breeze higher, than normal. At Liverpool gasworks blends of gas-coal were used in horizontal retorts with up to 60% of weakly-caking coals. With such blends it was possible to carbonize the charges in 9 to 10 hours at the normal temperatures. Coke of high combustibility relative to normal gas-coke was produced, but the yield of gas was described as rather below normal. Recently, Mr. J. Roberts, who has for long advocated the carbonization of blends to produce reactive coke, has described experiments with satisfactory results on the carbonization of good gas-coals blended with 30 to 50% of non-coking coals. Full-scale trials with coke ovens showed that a good free-burning coke was produced, and that the carbonizing time was appreciably reduced.

Briquetting

As a result of the introduction and increasing use of mechanized methods of mining, an increasing proportion of the coal produced is in the form of fines, frequently of high ash content. If such fine coal has sufficiently high caking power it gives no special difficulty in the carbonization industries, provided it is adequately cleaned. Where the coal is without caking property, however, special methods are required if it is to produce hard coke when carbonized. One of the methods which has found wide application is to briquette the coal under pressure, either with or without some agglutinant to act as a binder.

With bituminous coals the briquetting process involves drying the coal, blending with binder, heating and pressing. It is desirable to reduce the moisture content to about 2% and to grind the coal. The optimum size distribution of the ground coal depends on the type of coal, the type of the binder used, and the size and type of briquette made. The binder most generally used is coal-tar pitch, usually of medium soft variety, although many other types of material such as bitumen, tar, starch, molasses and sulphite lye have been used. The amount of binder necessary depends upon many factors including its nature and the size distribution and type of coal; 6 to 8% pitch is normal with bituminous coals. The pressures applied do not generally exceed about 2 tons/sq. in. It is important that the moisture content and temperature of the mixture fed to the press should be correct; the moisture in the mix is generally adjusted to not over 2%, and the temperature to just above the melting point of the pitch binder. On leaving the press the briquettes require careful handling until they have cooled. It has recently been shown that a maturing treatment, consisting of heating briquettes for a period of 2 hours or more to a temperature of 200 to 300°C. before carbonization, is effective in increasing the strength of carbonized Western Australian coal briquettes.

Brown coals for carbonization are generally briquetted without binder by using substantially higher pressures than are applied to bituminous coals. Drying to 10 to 15% moisture is necessary and the coal is crushed to small size generally about 4 mm. to 0. Various types of presses are used, some of the extrusion type and some of the mechanical ram type. A comparatively recent type is the Krupp-Herglotz double ring-roll press in which pressures of up to 15 tons/sq. in. are applied. Briquetting of hard lignitic brown coal without binder is appreciably more difficult than earthy brown coal, and according to B. G. Simek pressures of up to 20 tons/sq. in. are needed. Briquetting technique is applied not only to non-caking coals but also to blends of coals or of coal with coke or semi-coke. Several attempts have made to briquette bituminous coal at moderate pressures by heating it to just below the decomposition point and to press it while in a semi-plastic condition. The conditions necessary, however, are critical for industrial operation. The National Coal Board has recently developed a process which will allow of the briquetting at temperatures of 250 to 450°C. of coal or pre-heated coal. A binder found successful for such use is a mixture of coal with coal-tar or pitch. By using 10% of such a binder hard briquettes, suitable for subsequent carbonization, have been produced at the normal pressures of 1.5 to 2 tons/sq. in. The briquettes are as strong as pitch-bound briquettes made at 70 to 80°C.

Applications

Bruay Process

In the Bruay process dry, small-sized strongly-caking coal of 35 to 40% volatile matter is blended with semi-coke produced from the coal. The blend after fine crushing and thorough mixing is carbonized at medium temperatures in narrow coke ovens. The semi-coke is prepared by carbonization of some of the caking coal 9 pre-oxidized in air to reduce its caking power (if necessary) to a temperature of about 550°C. in an externally heated rotary retort.

Disco Process

The Disco process as now operated near Pittsburg on a scale of about 1,000 tons of coal per day utilizes washed fines, below ⅜ in., of bituminous coal of 37% volatile matter for the production of reactive domestic coke in the form of balls. The coal is first dried from 12 down to 3% moisture with hot flue gases in flash driers. The dried coal, mixed with semi-coke fines recirculated from the later carbonization stage, is then preheated to about 320°C. to reduce its plasticity during carbonization to a maximum temperature of 480°C. It is then converted into coke balls of 15 to 17% volatile matter content. All the semi-coke breeze below ⅜ in. produced is recirculated, and its addition to the coal is said to control the process of 'balling' and to improve the structure of the final product. Preheating of

the coal is effected in multideck rabble roasters externally heated by flue gases from the carbonizers, the upper decks being used for pre-heating, and oxidation if necessary, and the lower decks for storage to ensure a steady rate of feed to the carbonizers. The process is continuous and the Disco coke produced is strong, easily ignited and smokeless. Yields of by-products per ton of coal charged are: 1,610 lb. of Disco, 4,100 cu.ft. of gas of calorific value 375 B.Th.U./cu.ft. and 13 gal. of crude tar.

Coal-Logs Process

The Coal-Logs or Storr process permits the continuous treatment of coal in two stages. In the low-temperature section a thin layer of coal is heated to 400 or 500°C. in a vibrated horizontal retort. When in the plastic or semi-plastic state the treated coal is compressed at a pressure of 40 lb. per sq. in. and extruded in the form of solid cylindrical logs which are strong and homogeneous. They contain 18 to 20% volatile matter, ignite readily and are said to be smokeless. The logs can be further treated in the second section of the plant by carbonization to 1,000°C. to produce hard coke of 2% volatile matter.

Lurgi-Spulgas Process

Brown coal, which may contain about 50% of moisture as mined and is non-caking, requires pretreatment before it can be carbonized to produce lump coke. A process developed in Germany and used on a large scale for the production of coke for domestic and industrial use is the Lurgi-Spulgas system. The crushed brown coal is first dried to between 10 and 15% moisture in a stream of hot inert gases. The dried coal crushed to 4 mm. to 0 is then briquetted without binder either in extrusion presses at a pressure of 10 tons per sq. in. or in Ring Roll presses at pressures of up to 15 tons per sq. in. The briquettes are carbonized in a continuous type vertical shaft retort consisting of two sections one above the other, the upper section serving for drying the briquettes before they are carbonized in the lower section. Heating in both sections is by internal circulation of flue gases produced by burning gas obtained on carbonization. Gas circulated through the carbonizer is normally at about 700°C. although this may be raised to 900°C. if coke of low volatile matter content is required. The coke is dry-cooled by circulated gas before discharge; it normally contains 10 to 12% volatile matter, up to 20% of ash, and is particularly reactive. The briquettes break down appreciably on carbonization and much of the coke produced is below 20 mm. in size. Typical yields of products are coke 50% and tar 13% of the briquettes charged. The gas produced, of low calorific value, 1,800 to 2,000 cal. per cu. m. is used for supplying the necessary heat for the process. Surplus gas varies in different installations but may be up to about 280 cu. m. per ton of briquettes. Lurgi plants of this type have been installed with up to 20 units of total throughput 7,000 tons per day. Some of the plants have used non-caking or slightly-caking bituminous coals.

Phurnacite Process

The Phurnacite process, operated in Great Britain by the National Coal Board, was developed for the production of hard coke suitable for use in domestic stoves of the closed type, from certain non-caking high rank coals of Type 201 (volatile matter 9.6 to 14%) in small size. Coal of near 12% volatile matter is preferred. The washed small coal is thermally dried, mixed with broken pitch and disintegrated to small size. The mixture is then briquetted at about 80°C. in roll presses which produce ovoid briquettes of size 2 in × 1⅛ in × 1 in. The briquettes are cooled and then carbonized to a temperature reaching 800°C. in 4 hours to increase their strength and to render them smokeless. Carbonization or 'stoving,' is effected in externally heated vertical chambers. The plant at Aberaman, South Wales, has a capacity of 300,000 tons of briquettes per annum. The briquettes show little breakage on carbonization; the Phurnacite produced has about 4% volatile matter, is very strong and makes a clean high-grade fuel for use in closed domestic stoves.

New Processes

N.C.B. Process

The present Phurnacite process requires a narrow range of types of coal for satisfactory operation. Unless the coal is non-caking and non-swelling the briquettes will distort and stick together on stoving. The supply of suitable coals is limited and the N.C.B. is at present concentrating much experimental work at its Central Research Establishment near Cheltenham, on the problem of suitable pre-treatment of other coals to make them satisfactory for the production of coke of the Phurnacite type. This work has shown firstly that high-rank weakly-caking and medium-caking coals of Types 202, and 203 (up to about 18% volatile matter) can be made suitable by mild oxidation at a temperature of about 300°C. This treatment markedly reduces the plasticity of the coal so that when briquetted and stoved a satisfactory hard product is obtained. Secondly, high-volatile weakly-caking low-rank coals such as those of Types 700, 800 and 900, which constitute a considerable and increasing proportion of the output in Great Britain, much of it in the form of fines, can be rendered suitable for the production of briquetted hard coke by pre-carbonization to about 600°C. Processes involving such pre-treatments are being developed and have reached the pilot-scale stage. Oxidation treatment of small coal is effected in a continuous fluidized bed system in which the coal, first preheated by gas, is oxidized in hot oxygen-containing gas. Carbonization of the low-rank coals is effected in a similar fluidized bed system by means of superheated steam and hot gas. The semi-coke char is suitable for subsequent briquetting and stoving. Yields of tar appreciably higher than those of normal low-temperature carbonization processes are obtained by this method. Pilot-scale trials are also in progress on a continuous and internally heated system for the final stoving of the briquettes. In this process he heat required for carbonization is provided by heated sand introduced with the briquettes into the top of a vertical retort. Satisfactory carbonization can be achieved in a period of 1 hour as compared with 4 hours in the Phurnacite process.

These processes, together with the briquetting of pre-heated coal at high temperature which as previously mentioned the N.C.B. is developing, suggest the possibility of development on a commercial scale of a combined continuous process, having high heat economy, for the production from a wide range of weakly-caking or non-caking small coal either of hard coke for domestic stoves or of reactive coke suitable for the open fire-grate.

National Fuels Process

Another new process for the production either of domestic or metallurgical coke in briquetted form is the National Fuels process. This process, developed by the National Fuels Corporation of New York and the American Cyanamid Co. is operating on a scale of 100 tons/day at Bethlehem, Pa. It is claimed that it can produce carbonized briquettes of substantially uniform quality and strength from any coal of B.S. Swelling No. 1 or over. A wide range of coals excluding lignites and sub-bituminous types, can be used. The following stages are involved: (1) Drying the coal to less than 1% free moisture, (2) Crushing to 20 mesh (Tyler), 90% below 28 mesh, (3) Oxidation of the coal where necessary to reduce the Swelling No. to 1, (4) Briquetting with tar or pitch, (5) Carbonization of the briquettes.

Oxidation of the coals at temperatures of 300° to 475°C. is by passing a fluidized coal/air mixture through a pipe coil in a heated furnace during a period of 2 to 3 seconds; the decrease of volatile matter in the coal is less than 1%. The oxidized coal is cooled to 65°C. and briquetted with 8% of pitch binder in roll presses. Carbonization of the briquettes is effected in a continuous vertical retort in which heating is by hot combustion products of gas produced in the process. The briquettes are pre-heated to about 350°C. in the upper section of the retort and are later heated in the middle section at a carefully regulated rate of 2° to 3°C. per minute from 350° to 500°C. The success of the treatment depends on careful regulation of heating rate over the critical temperature range, which includes the plastic range of most coals. In the lower section of the retort the temperature is raised at a higher rate to either 600°C. or 900°C. depending upon whether the coke is required for the domestic or industrial market. The retort is designed to allow of the necessary heating rates in different sections. The carbonized briquettes are dry-cooled in circulated gas before discharge.

The process gives gas of calorific value 485 to 325 B.Th.U. per cu.ft. depending upon whether or not the gas and air, used to provide the heating, are pre-heated before entering the retort:

(*Concluded on p. 130*)

6th INTERNATIONAL GAS CONFERENCE PAPER

Tests on the Coking Properties of Coal

By Mr. Dir. Dipl. Ing. G. Düwel (*Germany*)

Coke is, financially, an essential item on the revenue side of a coke oven plant. It is in the free market subject to the competition of other fuels: gas, electric energy, coal and oil and its derivatives. The effective sale of this coke is safeguarded only when it is of high quality and of uniform characteristics. These coke quality requirements can only be attained in the face of the varying supply of the basic material 'coal,' by proper treatment prior to carbonization. Coal is prepared for the coking process in coal preparation plants in accordance with results obtained by laboratory tests. The prerequisite for any preparation of coal is, however, a true knowledge of the coal and the establishment of coke quality requirements.

Our requirements for the quality of coke are as follows:

(1) The grade of coke supplied to the consumer must be of sufficient stability and have but little abrasion.
(2) The size of the coke grain should not differ much from the size limits allowed, *i.e.*, the coke must have but little oversize and undersize.
(3) The reactivity of the coke as a measure for its combustion behaviour must be suited to its specific use.
(4) Ash content, water content, and thus the calorific value must be within fixed limits.
(5) The fusion characteristics of the coke must be uniform so that the consumer may provide for fixed combustion conditions.
(6) The coke should be sharp-edged, of silvergrey colour, dense cell structure and uniform appearance.

Ash contents and fusion characteristics are to a great extent given by the locally available classes of coal.

The quality of coke is influenced by the following factors:

(1) Type of coal.
(2) Kind and extent of preparation of coal.
(3) Type of oven and its operation.
(4) Preparation of coke.

Within the coke preparation process the form of coke quenching (dry or wet) will influence appearance and water content of the coke, as well as the specific gravity of the individual grain. The design and construction of the coke crusher will influence the grain structure of the coke sizing. The type of oven, whether horizontal, vertical, inclined or retort, is of influence on the lump size of the raw coke produced, the stability factor and the cell structure, and thus on the reactivity of the coke. In a like manner broad or narrow oven chambers will have a distinct bearing according to the different rate of coking at like oven temperatures. An increase in the rate of coking brought about by higher oven temperatures could alter the quality supposing that the oven brick material is up to this higher strain of temperature. Decisive for the density of the coke grain, its cell characteristics, and thus reactivity and hardness, is the bulk density of the coal in the oven and the kind of charging.

During the handling, storage and preparation of the coal, the following factors will have a bearing on the quality of the coke: Duration and kind of storage and the ageing thus caused, the kind of coal grinding and blending; the addition to high volatile coal of lean coal or finely ground coke breeze; the granulation obtained by the preparation of coal, and the moisture of the coal charged and the possible addition of oil to the coal.

In detail the softening and coke formation of a caking coal may be grouped into the following zones:

(1) In the softening zone the fusible coal constituents begin to melt, dissolving each other and forming a more or less viscous, pasty mass. Within this range occur, particularly, the physical reactions.
(2) In the resolidification zone following there occurs, by interreaction between the individual coal constituents, decomposition and dissociation of coal constituents of high molecular weight by splitting off of gases and tar vapours, leaving a high-carbon residue (semicoke).
(3) The semicoke thus formed, having almost completely closed cells, is degassed in the subsequent semicoke zone under contraction, with the bursting of the gas cells of the semicoke and formation of the open cell volume.

As to the fusibility of a coal the following characteristics are particularly significant: (1) Softening point, (2) fluidity zone, (3) semicoke point, (4) transition from semicoke to the finished product.

For the creation of a well formed coke, of first and foremost importance is the low and, above all, even development of a melt of highest fluidity, followed up by a short resolidification period and a slow coke forming process so that a not too heavy cleavage of the semicoke will occur. The quality of the coke will besides be essentially influenced by the course of the gas formation. A heavy release of gas during the softening zone is due to the premature chemical disintegration of part of the bitumen which is so vital to the coke forming process, and during the state of high viscosity, will cause the swelling of the melt. That is, a large increase in volume of the disintegrating coal, if not impeded, forms a spongy coke. Heavy splitting off of gas in the resolidification zone will generate an expansion of the coal, that is, an increasing volume exerting a heavy pressure against any resistance. Heavy subsequent degassing in the semicoke zone will cause the formation of cracks, cleavage and the contraction of the coke.

Test Methods for Coal

Within the plant practice of the Hamburg Gas Company we have been dealing with the following test methods:

(*a*) The method of the coking still.
(*b*) Tests carried out in plant practice by examining samples of coal in the coking box and in the oven chamber.
(*c*) The plastometric method.
(*d*) The application of the Foxwell apparatus.

From the coal supplied to our coke-oven plants a sample is taken (on arrival by ship) according to the German Industrial Standards (DIN 51 701). The average sample of the incoming cargo is to represent a partial amount of the fuel that proportionally corresponds to the average of the cargo to be judged with respect to characteristics and sizing. This average sample will supply the following data: Water content of coal; ash content in dry coal and coal as received; volatile matter in dry coal and coal as received; fixed carbon in dry coal and coal as received; yield of coke based on dry coal and coal as received; combustible sulphur; gross calorific value; net calorific value; elementary analysis of carbon in dry coal, in coal as received and in dry ash-free coal; hydrogen in dry coal, in coal as received and dry ash-free, sulphur, oxygen, nitrogen.

Table 1.—Examples of Analyses of Classes of Coal Tested

	1	2	3	4	5	6
H_2O	6.3	5.5	5.7	8.0	11.8	17.4
Ash, dry	5.1	6.8	7.5	6.8	9.4	16.5
,, as received	4.8	6.4	7.1	6.3	8.3	13.6
Volatile matter, dry	26.8	24.7	22.3	25.4	30.7	21.3
,, as received	25.1	23.3	21.0	23.4	27.1	17.6
Yield of Coke, dry	73.2	75.2	77.7	74.6	69.3	78.7
,, as received	68.6	71.2	73.3	68.6	61.1	65.0
Fixed carbon, dry	68.1	68.5	70.2	67.8	59.9	62.2
,, as received	63.8	64.7	66.2	62.4	52.8	51.4
Combustible sulphur, dry	1.04	0.81	1.2	1.17	1.08	1.45
Gross cal. value, B.Th.U. per pound	14608	14386	14219	13952	12679	12762
Net calorific value, as received	13169	13101	12939	12305	10635	10032
Thermal yield	9.7	9.9	9.9	8.9	7.1	9.6
Carbon, dry	81.84	81.00	79.73	79.76	72.58	71.79
,, as received	77.67	76.55	75.19	73.38	64.02	59.30
,, dry, ash-free	86.24	86.92	86.20	85.58	80.11	85.98
Hydrogen, dry	4.88	4.74	4.45	4.98	4.89	4.01
,, as received	4.63	4.48	4.20	4.58	4.31	3.31
,, dry, ash-free	5.14	5.09	4.81	5.34	5.39	4.80
Oxygen + Nitrogen, dry	7.14	6.65	7.12	7.29	12.05	6.25
Softening, °C	1330	1380	1300	1230	1260	1245
Fusing, °C	1540	1505	1570	1340	1330	1470

Further, the ash fusing properties, characterized by the sintering, softening point and fusing point, will be ascertained, and the characteristics of the coke will be determined by the crucible test. In this way we obtain the first rough characterization of the coal. (Table I.)

In the case of coal supplies from the United States, we have also recourse to the coke-button test established by the American Society for Testing Materials for the judgment of the expanding and swelling properties, and of the coke quality.

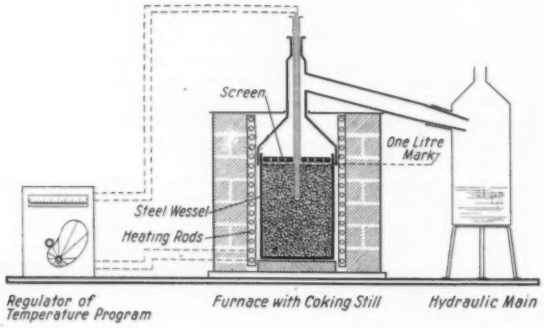


Fig. 1. Mode of procedure to determine the coking power by means of the coking still.

The Coking Still

For the determination of the hardness of coke by means of the coking still method the apparatus used is shown in Fig. 1. The central part is a cylindrical steel vessel equipped with a distillation head, holding a volume of one litre of coal to be tested. Introduced into the coal is a thermocouple which will report the temperature to a programme regulator. By means of the programme regulator the heating of the vessel is controlled so that definite rates of increase in temperature are obtained.

Eight hundred and thirty grammes of coal (containing 10% of water) and in its original grain size (up to 8 mm.) is introduced into the steel vessel filling it up to the litre mark. A steel screening plate is loosely put on the surface of the coal. The vessel is then closed by the distillation head and put in the furnace which is preheated to 800°C. The carbonization is made by a uniform rise of temperature in such a way that after a lapse of two hours a temperature of 800°C. is reached in the core of the vessel. The coke is, at this temperature, left for another half hour in the furnace. Thereupon the vessel with the coke is quickly cooled by plunging it into cold water. The best pieces of coke are, by means of a pointed hammer, split down to sizes of between 15 and 20 mm.; 100 gr. of this is beaten in a small laboratory drum for one minute, and then screened. The percentage over 10 mm. size is the laboratory drum value.

Box and Production Coking

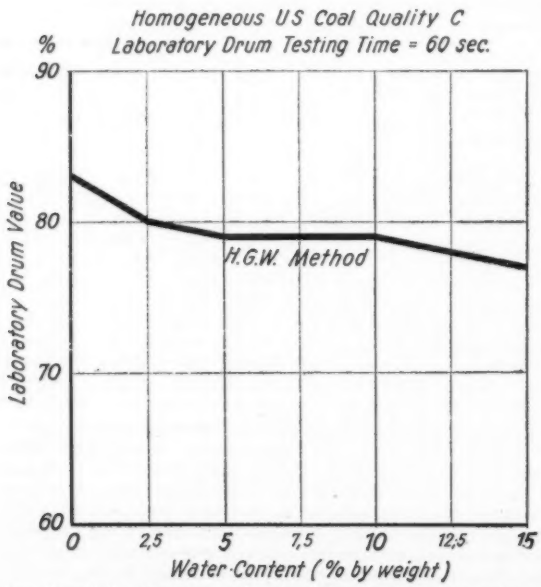
Coking tests by box are carried through with coal in its original state. After filling with 105 kg. of coal the box is jolted repeatedly in order to obtain a suitable density of its contents. Just before filling a horizontal chamber of a coke-oven battery, the box is placed in the centre of the chamber sole. The content of the box is thus subject to the same temperature and carbonization time as the normal oven charge.

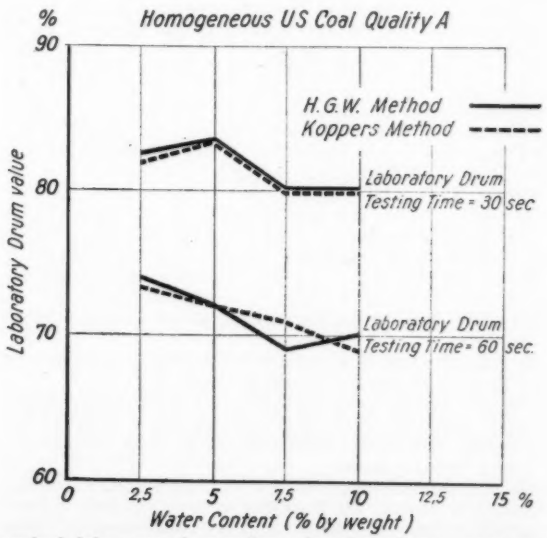
On the discharge of the carbonized chamber the box is picked up, quenched by water, opened and the coke spread in the open air for additional cooling. The hardness of the coke from the box is ascertained by the Micum drum test, as is done with the production coke. For a test 50 kg. of coke taken from an average sample of the grain exceeding 60 mm. is filled into the Micum drum. After the testing (100 revolutions in four minutes) the percentage of grains over 40 mm. is called Micum value.

Results

In order to judge the coking properties of a coal from results obtained by the first and second testing methods, the relation that exists between these results and results expected in practice, must be known. The results of these tests show that the Micum values of the box samples, and the samples of coke from a normal course of production are, in the case of one and the same coal or coal mixture, of like magnitude. The laboratory values of coke samples obtained by coking-still tests are altogether lower than the Micum drum values of the pertinent production and box tests. In the case of plant conditions prevailing in Hamburg the Micum value to be expected from a coke sample may be calculated by multiplying the laboratory drum value by the factor 1.07.

Individual coal samples have been subjected to a multitude of tests by means of the coking still. The variations from the mean laboratory drum value of the coke tested, were always smaller than ± 2.5 units. It may be assumed that these variations from the mean value are within the accuracy of measurement required. Hence we may infer that the dispersions of the Micum or laboratory values shown in the results are to be ascribed to real differences of coal within the same class of coal. A noticeable influence on Micum values of box or plant production coke is possible by varying the oven operation. If we assume that the coking procedure in the coking still is representative of the proceedings in the box or chamber-oven coke-production, we may use the coking still method to deter-





Figs. 2 and 3. Hardness of coke determined by the coking still method, laboratory drum value a function of water content of coal charged.

mine other influences exercised on the hardness of coke. Tests were carried through to ascertain the interdependence of laboratory drum value and moisture of the coal charged. We worked with various conditions of preheating temperature, coal sizing and fixing of the screen lid in the coking still. The cokes produced were tested in the laboratory drum at various run periods. It turned out that the Micum values or drum values had a falling tendency when the moisture increased. (Figs. 2 and 3.)

We further tested two different coals in the coking still in various fractionations of coal grain. For each individual screening step of each coal, a test was carried through in the coking still. At the same time the pertinent percentage of volatile matter was also determined for each screening step. The relations found point out that the percentage of volatile matter increases as the size of the coal grain gets coarser. The hardness is decreasing with the coarser coal grain fractionation.

The testing methods mentioned so far show results which are directly comparable with those of the plant production process, both for the individual coal and blend of coal. They do not allow a prediction as to the suitable ratio of blending several coals. The testing methods mentioned hereafter lead to results which have no direct relation to results obtained in plant operation, but which will allow the drawing of conclusions, based on the course of the test, as to the behaviour of the individual coal or blend of coal. A comparison of results obtained for the individual coals may form the basis for fixing the ratio of mixture of several classes of coal.

Plastometric Method

The aim of this method is to predict something of the final value of hardness of coke made of the respective coals, as is ascertained in the Micum drum. The apparatus applied by us is, on the whole, similar to the expansion test apparatus of Koppers. A steel cylinder of 60 mm. with perforated bottom is inserted into a refractory furnace. Bottom and walls of the cylinder are lined with asbestos paper, and 100 gr. of air-dry ground coal of 1 mm. maximum size of grain is filled into the cylinder. A piston is placed on the cylinder connected to a lever, to the end of which a weight is fastened that exerts a pressure of 1 kg. per sq. cm. (14.2 lb. per sq. in.) on the coal. At the end of the lever a stylus records the change of volume during the test enabling the reading of the expansion power of the coal at the same time. (Fig. 4.) Heating is from below at an exactly fixed increase of temperature per unit of time.

When the coal is filled into the cylinder a brass tube, which will be removed prior to the test, creates an empty space which is later permeated by the coal. At this place in the coal blend at certain intervals during the test a graduated needle 135 mm. long is introduced through a hole of the piston until a light

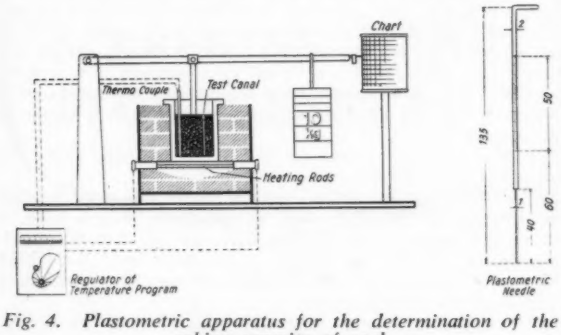


Fig. 4. Plastometric apparatus for the determination of the coking capacity of coal.

resistance is felt. This point means the upper limit of the plastic layer, and is noted. Then the plastic layer is pierced by means of the needle until there is a strong resistance by the solid semicoke formed. The limit between the solid semicoke and the half-fluid plastic mass is designated the lower limit of the plastic layer and is likewise measured. The individual points of the upper and lower limit thus stated are dotted on a chart in relation to temperature, the dots are connected by drawing a line through them, and thus we obtain two plastometric curves. The final contraction of the coal, given by the distance of the end point from the zero line, and the maximum thickness of the plastic layer, given by the widest distance

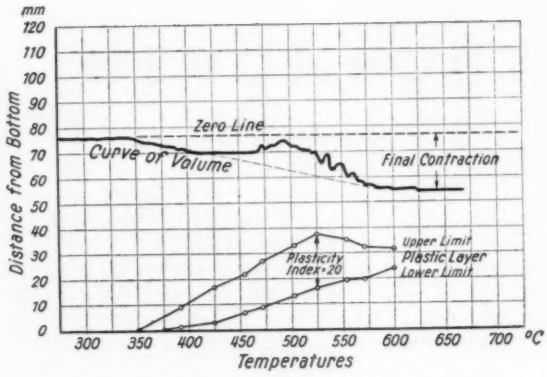


Fig. 5. Curve of volume and plastic layer.

between the upper and lower curve line of the plastic layer, mark the coking properties of the coal. A graph showing such a curve is shown in Fig. 5.

The plastometric apparatus to a great extent simulates the plant conditions. The heating is from one side only as in the oven, the products of decomposition may escape in all directions, and you can follow all stages of the coking process until the coke is formed. This condition is important, as the products of decomposition may influence the coke characteristics in different ways according to their flow through the coal or the coke.

The formation of the plastic layer has an influence on the coking property. The thicker the plastic layer is, the longer may the easily fusible constituents work themselves out on the heavier fusible ones or they may assume a distribution function and thus attain the homogeneity of the plastic layer. By this the coke molecule formed is bound more compactly, thus attaining a greater hardness in the entire coke body.

In the preparation of the coal sample the greatest value must be put to adhering to the different grain sizes according to the rules. For the evaluation several formulæ have been established enabling the calculation of the plasticity index *Pi* and the coke volume index *Ki* from the trend of the curve.

In computing the *Ki*, allowance is made for the influence of the relation between coke mass and volume of the semicoke which is, instead of the final contraction, drawn upon as a characteristic datum of the coking property of a coal. The formula itself is empirical, as it has evolved from the most varied considerations arising in the field of converting coal into coke or semicoke.

$$Ki = E + 83 - 100 \times \left(\frac{G}{V}\right)$$, where:

E = final contraction in the plastometric apparatus in mm.
G = weight of coke in gr. made from 100 gr. of coal.
V = volume in sq. cm. of semicoke in the plastometric apparatus.

The weight of the coke (G) is determined by coking, in the platinum crucible, 1 gr. of coal taken from the sample for plastometric tests. The volume of the semi-coke can be computed by formula (V) = 26 h, 'h' meaning the direct measured height of the semicoke in cm. The numerical value 83 is the relation in percentage between weight of coke and volume of semicoke for normal coal blends. The plasticity index *Pi* is the maximum distance of the lower from the upper plastic curve.

The Foxwell Test

The combined apparatus is shown in Fig. 6. In the furnace there is a massive bronze-block, traversed by many tubes, the temperature of which is controlled by a programme regulator. In one of these tubes coal is inserted for the Foxwell test. The Foxwell curve is identical with the pressure resistance which is suffered by a flow of nitrogen in the tube and is measured as a function of the temperature.

In another tube of the bronze cylinder a certain amount of dry pulverized coal is carbonized in a Bochum platinum crucible taking at the same time the Foxwell curve. The degassing is registered through a Coulomb's balance. The course of the plasticity curve will give information on the coking properties and will particularly indicate as characteristic

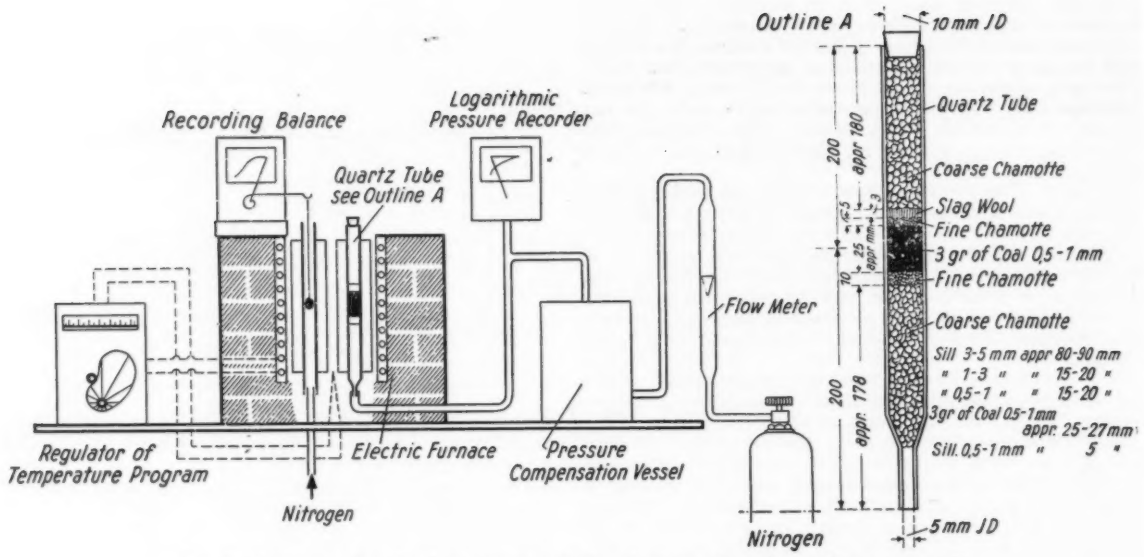


Fig. 6 Apparatus for the determination of the plasticity of coal according to Foxwell.

data the softening point and semicoke point. The caking capacity of the coal manifests itself within the plasticity range. Temperature, course of carbonization and plasticity curve are mapped out in relation to temperature. Practice has shown that, if the degassing is heavy within the plastic zone, there will be a spongy coke in the normal production practice. The degassing is extremely heavy in the proximity of the semicoke point. From this we may infer that the plastic component of the coal is beginning to resolidify after a severer decomposition has taken place. Decomposition involves a heavy formation of gas. The test is carried out as follows:

In order to take the Foxwell curve we fill in 3 gr. of coal of 0.5-1 mm. sizing in the way that may be seen in Fig. 6. For the recording of the course of carbonization we weigh and insert 5 gr. of dry pulverized coal of 0 to 1 mm. sizing into the Bochum platinum crucible. After having inserted the substance to be tested into the tube of the bronze block the electric furnace is heated up. The rate of temperature increase will be 20° per min. up to 200°C., 5 degrees per minute in the range of 200° to 300°C., 2.5 degrees per minute from 300° to 600°C., and 5 degrees per minute from 600° to 800°C.

According to experience gained by the laboratory of the Deutsche Bergbau-Leitung (German Coal Mines Management) the degassing has to amount to at least 80% above the semicoke point if the coke is to have a fine-pored surface and an optimum of hardness. The appropriateness of a coal blend made from two components for the production of a hard coke will be indicated depending upon whether the plastic zone of the two components will overlap or not. In the latter case a coke of a very poor hardness may result if the coal component resolidifying first has an insufficient binding power.

A novel apparatus was developed by Echterhoff, Germany, and brought out as 'Plastograph' by Brabender for the determination of the softening properties and of the course of carbonization during the coking process. In this apparatus the coal sample is worked well during the heating by a specially designed kneader. The kneader shaft is moved through a bevel gear drive by a pivoted motor while the forces exerted by the rotating shaft in the kneader are, over a system of balances, recorded on a chart in relation to time. The curve recorded on the chart characterizes the plastic behaviour of the coal during its heating. The tests are reproducible. The combination of the curves on the softening behaviour and of the course of carbonization of a class of coal will allow the drawing of a conclusion as to the coking behaviour of a coal and the mixibility of several components. To this testing method, which will possibly undergo a certain evolution, we attach a special significance with respect to judging the coking behaviour of coal.

The Testing of Coke and its Reactivity

At the outset of this paper we established the quality requirements we put on the coke. As the Hamburg output of coke is to a great extent used as a domestic fuel, the measure for the stability of the coke is based on the drum results obtained from coke *I* (sizing 60-80 mm.). Fifty kg. of coke *I* are tested in the Micum drum at normal conditions. The measure for abrasion is the percentage of grain under 10 mm., which must not exceed 5% to 6%.

Each size grading of a coke is daily checked for grain size by a screening test. Oversize and undersize must not exceed 10% for coke *I* and *II* (grain size 40 to 60 mm.), 5% for coke *III* (grain size 20 to 40 mm.), and coke *IV* (grain size 10 to 20 mm.). The reactivity of the coke is ascertained by a method of Koppers which was revised by the latest findings, and according to which a certain amount of coke, finely crushed in a mortar, of 0.5 to 1 mm. granulation is heated in a quartz tube to 950°C. Through this heated coke is passed a measured flow of carbon dioxide, which will be partially reduced to carbon monoxide. The resulting gas mixture is caught in gas pipettes and analyzed. The reactivity may be found by the relation of CO_2 and CO in conformity with the Boudouard equilibrium.

Further, the flash point of the coke is determined by the method of Bunte. A certain amount of coke finely crushed in a mortar to a granulation of 0.5 to 1 mm. is, during the heating up period within a closed tube, exposed to a flow of oxygen. In pursuing the rising temperature by means of a thermocouple the typical flash point of the coke is indicated by a sudden rise.

Ash and water content as well as the calorific value are determined by the well-known methods.

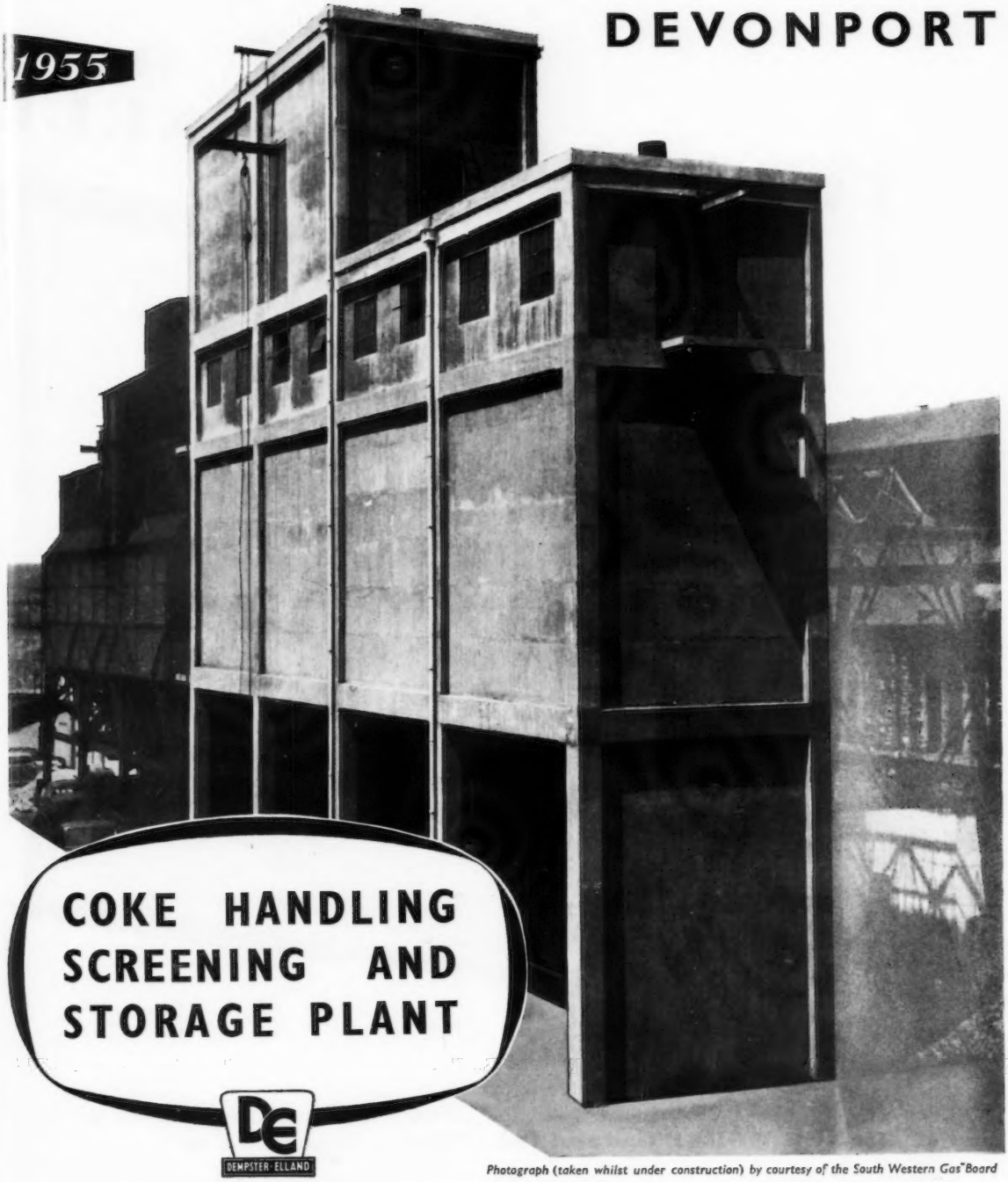
For the determination of the ash fusing point the heating microscope of 'Leitz' is used which admits, on one hand, a current observation of the behaviour of the ash test body during the heating, and allows on the other hand the taking of photos by means of a camera in order to register individual phases of the fusing process.

The apparatus consists of an incandescent lamp, an electric furnace, as well as the appliances for observation and taking photographs. All three parts are incorporated movably on a triangular bar enabling a fine adjustment and alignment of the trace of rays. An ash test body of cylindrical shape, 3 mm. diameter and 3 mm. height, is put on a small steatite crucible and inserted on a movable holding device at the rear end of the furnace casing and put again into the furnace. Just over the ash test body is the soldering point of a thermocouple allowing the current observation of the temperature. The ends of the furnace tube are capable of being blocked by quartz plates permitting 'control of the atmosphere'—oxidizing or reducing—inside the furnace by passing a flow of gas through

(*Concluded on p.* 136)

DEVONPORT

1955



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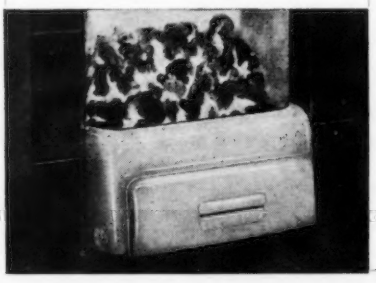

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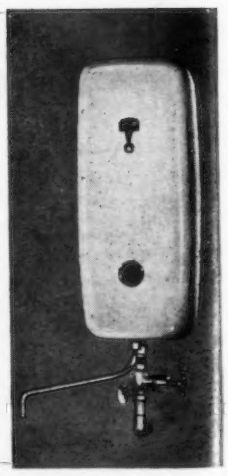

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PROGRESS IN WALES*

By J. H. CHAPMAN, M.INST.GAS E.†

As your Chairman for the year I must first of all apologise for my absence from your April meeting at Tenby, and the consequent failure to give my address at that meeting. My absence was due to matters beyond my control; perhaps you will forgive me for presenting my address at this meeting. I am particularly fortunate that during my year of office the Wales and Monmouthshire Section of the Institution of Gas Engineers celebrates its 50th Anniversary, and I feel very privileged to be the Chairman at this important stage of its life.

The Section's Origin

It would not be out of place to recall the origin of the Wales and Monmouthshire Section, the inaugural meeting of which was held in Cardiff on September 6, 1905, when the late Mr. Thomas Canning presided and the Wales and Monmouthshire Institute of Gas Engineers was founded. This title was retained until nationalisation of the gas industry when it was changed to the Wales and Monmouthshire Section of the Institution of Gas Engineers.

From its inception the 'Wales and Mon.', as it was familiarly known in its early days, has progressed steadily through the years with no spectacular displays or occasions but rather with steady endeavour and hard work, fostered and encouraged by the support given to it by the gas engineers of the day. The Wales and Mon. have always been fortunate in having a succession of very good Hon. Secretaries; starting with the late Mr. Octavius Thomas who as the first Secretary of the Association persuaded or cajoled the members until he obtained what he required, and was thus instrumental in establishing the Association on a sound footing. We have been very fortunate with his successors who have maintained the tradition which he founded.

Promotion of Science

Within the Royal Charter of the Institution of Gas Engineers, you will find among the objects and purposes 'to promote engineering science as applied to the gas industry in all or any of its branches and to facilitate the exchange of information among the members'. From the very foundation of the Wales and Mon.; members have been encouraged to give papers on any subjects appertaining to the gas industry and particularly on those subjects within the industry which come within their daily duties and labours; furthermore, the encouragement of open discussion on papers has always been a feature of the Wales and Mon. meetings. It is my considered opinion that the standard of the papers presented at our meetings will bear favourable comparison with the work carried out by other Sections of the Institution, and such a standard has been recognized by the award of the Silver Medal of the Institution of Gas Engineers to a member of the Wales and Mon. Section.

Education

In the field of education the Wales and Mon. Association has always endeavoured to keep well in line with the rest of the country, despite the geographical difficulties, which for many years made it impossible to run gas engineering courses at any centre other than Cardiff. Our Association was among the first to award prizes for examination successes and for many years the bulk of the income from the Octavius Thomas Memorial Fund was devoted to this purpose; in this connection it should be remembered that such awards were not made solely to professional gas engineering students, but also to successful gas fitting apprentices. The function of responsibility for all prize awards has now been graciously accepted by the Wales Gas Board who generously regard this as one of the obligations laid upon them by the Gas Act.

In the immediate post-war years the Association and its District Education Committee gave much attention and subsequent support to the intensive training courses designed and run by the gas industry, in conjunction with the Ministry of Labour, for the re-habilitation of ex-servicemen who had not been able to complete their education and training due to call-up in the 1939-45 war. These courses were held at Bournemouth, Bristol, Bath, Birmingham and Bradford and several of the young men from Wales who attended these courses have made considerable advancement in status both at home and abroad.

The very large number of small undertakings, so greatly disproportionate to the very small number of larger undertakings in Wales, has been the greatest difficulty with which the District Education Committee has had to contend in endeavouring to arrange suitable courses. The Education Authorities have always been most helpful and in many cases were prepared to run courses for only three or four students if these could be gathered together at one centre. However, all too often these efforts proved abortive due to the considerable distance apart of those few undertakings which were able to employ a pupil. This position was to some extent ameliorated soon after nationalisation when the Board's Articled Pupil Scheme was introduced, although the position still continues in a less acute form.

As a consequence of this, much of the work of the District Education Committee consists of advising individual students on their own particular difficulties, assisting them to secure exemption where the circumstances would appear to justify it, and in seeking to keep before the Gas Education Committee in London the views of our District. In session 1953-54 exemptions for all or some of the ancillary subjects for the 'Certificate in Salesmanship and Consumer Service' were supported and secured for no less than nine students. It must be pointed out, however, that all these nine students had been able upon investigation to produce evidence to prove that they had at some time previously successfully studied the relevant subjects to the required standard.

Following on nationalisation, the formation of the Wales Gas Board Education Committee necessitated a division of duties. This was simplified, however, up to December 31, 1953, by having the same Hon. Secretary for both committees, and although that practice ceased on the above date, when Mr. T. L. Davies was appointed Secretary of the Wales Gas Board Education Committee, complete and full co-operation continues and is assured by both Secretaries having representation on both committees, and other committee members also having dual representation.

Prior to nationalisation of the gas industry, members of the Wales and Mon. Section provided a service of chemists, technical assistants and technicians to the smaller undertakings who were not so well endowed in this direction as the larger undertakings. This service was appealed for frequently and very willingly given.

Support by the Board

There is one matter I must mention with regard to the Wales and Mon. Section and that is the support and encouragement given at all times by the Wales Gas Board. We are indeed indebted to them not only for the time made available for our meetings but for the active interest they have taken by personal attendance and by taking an active part in our deliberations.

Integration, gas grids and coke-oven gas are very much to the fore in the gas industry today, and Wales was among the pioneers in this development. As far back as 1907 Caerphilly were taking coke-oven gas for distribution to their consumers. Integration before nationalisation was not easy because of varying interests where the undertakings were owned and controlled in some cases by local authorities and in other cases by companies. The development of holding companies helped considerably the progress of integration, but frequently the under-

* The Chairman's Address to the Wales and Monmouthshire Section of the Institution of Gas Engineers.

† Western Grid Engineer: Wales Gas Board.

takings which they owned and controlled were not adjacent to each other and a continuous connecting link was not possible. This interruption or break in the line often meant that integration could not be fully developed to the advantage of all the undertakings.

Before nationalisation, however, considerable progress had been made in the preparation of schemes for distribution of coke-oven gas in South Wales; indeed, coke-oven gas was being taken by the Port Talbot undertaking from the coke ovens at Margam of the Steel Company of Wales.

Working Parties

As a result of the considerably increased demands for gas by both domestic and industrial consumers in South Wales and the possibility of obtaining increased supplies of coke-oven gas in 1946, meetings were convened by the Ministry of Fuel and Power, and at these meetings it was decided to explore the possibility of utilizing the increased quantities of coke-oven gas in South Wales. Two working parties were formed, one to cover the Eastern (Cardiff) section and the other to cover the Western (Port Talbot) section. These working parties consisted of the local gas engineers with representatives of the Ministry of Fuel and Power and the coke ovens concerned.

The reports of these working parties were published in 1948, and it is appropriate to refer to the tremendous amount of work involved in preparing such reports. Essential information had to be obtained from the undertakings, including estimated short and long-term requirements; the short and long-term policies of the coke ovens concerned and the future development of the district as a whole. Questionnaires were prepared and circulated to all concerned, so that a clear picture could be obtained as to what the requirements were throughout the district before even an outline scheme was prepared. In addition the gasmaking capacities of the existing gasworks and the extent to which they could be economically utilized and co-ordinated with the coke oven supplies was a matter which had to receive careful consideration; purification and gasholder storage capacity to take the additional coke-oven gas also had to be provided for.

From all this data and information alternative schemes for the distribution of coke-oven gas in varying quantities were prepared and examined. The economics of these schemes with different-sized mains and consequent varying power costs were calculated for immediate requirements and for various rates of development.

The Gas Grids

With the advent of nationalisation the Wales Gas Board took immediate steps to develop the gas grids in South Wales. These steps were based on the two original reports, amended in the light of recent information and with extensions made possible by reason of their authority over a greater area. The extent to which the gas grids have been completed in South Wales is well known; in addition, of course, the Wales Gas Board are developing a very extensive grid system in North Wales.

I have referred to the South Wales grids, in particular, because I was very closely associated with these schemes both in the preparation of the Working Party report on the Western District in 1948 and subsequently in the final report prepared by the Wales Gas Board. The alternatives which can be found are endless and almost submerge one in a mass of calculations.

It was anticipated that with the advent of coke-oven gas and gas grids a reduction in the price of gas to the consumer would be possible, but with the rapid and continuous increases in the cost of material and wages this has not come about. It can safely be said, though, that without coke-oven gas and gas grids the price of gas in Wales today would be considerably higher.

The completion of these grids so far have already relieved the engineers of many undertakings of the responsibilities of gas manufacture and the constant worry of failure of supplies, and they must welcome the opportunity of being able to devote more time and thought to their own distribution systems. It would be a comparatively easy problem to design and lay an entirely new distribution system for a town, but it is no easy matter to extend and improve an existing overloaded system where the increased demands for gas are not within a short distance of the works but on the perimeter of a town where the existing mains are of a small diameter.

All the gas grid mains in Wales are designed to carry a very much larger quantity of gas than they are taking at present, and the design of any scheme to improve or augment the distribution system within an undertaking must provide a similar margin without embarrassing the present gas requirements with heavy capital charges.

With the gas available and the mains to carry it the next point for concentrated effort is in the sale of it. Much has been written on this subject and only last month a Sales and Service Conference organized by the gas Council was held at Ayr in Scotland. This meeting, extending over three days, is a clear indication of the importance the Gas Council attaches to the selling side of the industry, and many valuable and informative papers were given on this subject.

There are many married women employed today, and this means they have considerably less time to devote to their household duties, particularly in the preparation of food, and appliance displays are attractive to them when they can see for themselves that such equipment would make their duties at home less arduous and save considerable time. Although a married woman may be employed she does not want to spend her whole day working and the only way she can avoid this is to reduce the time given over to household duties in order to give her some leisure time.

Salesmanship

The gas industry is not the only competitor for this cooking and heating load; labour and time saving equipment is available, using all types of fuel, and salesmanship is going to enter very largely into the extent of our success.

Every branch of salesmanship will have to play its part: showrooms, exhibitions, displays and cookery demonstrations will have to be made very attractive if we are going to obtain our share of this market. Indeed everyone within the industry must play their part and take any opportunities that may arise to draw attention to the use of gas and the service we have to offer. Cookery demonstrations have in the past, from my knowledge, attracted many ladies who certainly do not use gas for cooking and who have been agreeably surprised at the speed and efficiency of our equipment.

Salesmanship is a job for which not everyone is equipped or has the right temperament; considerable care has to be exercised in obtaining or training the right personnel for the public they will meet. The men from within the industry who meet more of the public than even members of the sales staff are probably the gas fitters who are calling at numerous homes each day and they can do a good deal to further our interests and promote the sales of gas; a suggestion or word of advice at the right moment, while carrying out their daily duties, would often arouse the householder's interest which would be the first valuable step in obtaining the sale of additional or improved equipment. It is not necessary for the fitter to enlarge on a precise description of the most suitable equipment for the consumers particular purpose or the price of it, but if he can interest them to the extent that they will call at the undertaking's showroom, there they will not only see the wide range of modern cooking and heating units available to them in a variety of colours to tone with their decorations but will receive any further advice they wish to have with a complete range of prices. This is a contact with the public which I feel is not sufficiently appreciated and one that could be developed to the mutual benefit of the consumer and the industry.

The Personal Touch

I have found while negotiating wayleaves for gas grid mains, particularly with farmers who are going to have their good fields disturbed and with whom I have a good deal of sympathy, that a personal call explaining to them our aims and objects is received more sympathetically than an official application for a wayleave written in a 'jargon' which they do not understand and have not the patience to study.

While the farmer and landowner may be upset and concerned at the disturbance to his land, by pointing out to him how so many people are going to benefit by a grid and that it is not for one man's particular benefit but for the good of the general public, he will begin to appreciate, that he as an individual cannot stop progress and the 'march of time'. Consequently he will be inclined to take a more tolerant view of such an application.

Gas in Ireland*

By S. L. DOYLE†

IT may be noted from a recent report that Britain's coal reserves are variously estimated as sufficient for the next 300-1,000 years. Thus there need be no early anxiety on grounds of mining potential.

On the extractive side, however, coal raised is seriously below the pre-war level, and annual outputs now running around 220 mill. tons per annum, including opencast, contrast with heavy increase in the home demand. The combined effect is a growing gap, and the deficiency officially stated in the course of the Coal Debate was placed at a cumulative rate of two and a half mill. tons per annum. Moreover, this estimate takes into account an estimated annual increase in output of 500 000 tons, a figure which, modest though it might be thought, was challenged as unreal in the light of the present downward trend of outputs. In so far as the fall in coal output contributes to the present position, it is evident that even if the target output of 250 mill. tons by 1965 could be attained, the resulting balancing of requirements would at best be only temporary.

The influence of these factors upon the gas industry in Britain while unwelcome are in the area rather of embarrassment and adjustment of product pricing, and the impact of increased coal prices is felt in much the same measure also by its competitors. The prospect is also tempered by the official statement made during the Coal Debate—that there is unlikely to be further price increase in the home market for some considerable time. But for the Irish gas industry, particularly in the South, the competitive position is different and will weigh harshly on the small undertakings. The time has come when export differentials should be abolished and, as customers of nearly 150 years standing, we are entitled to look for fair and sympathetic treatment despite the complex considerations involved.

The cost of coal in the Republic is seven times the pre-war level and far outstrips increase in the commodity price level generally. Some recovery is afforded through the increased price of residuals, yet even on a net cost basis the position is relatively worse, and fantastic as it seems, the net cost of coal, *i.e.*, cost of coal into works less residuals, is now almost twenty times the pre-war figure and has risen from some 10% to around 50% of all costs. These features of our costings have sadly impaired our efforts to devise effective promotional tariffs in particular and lower prices generally.

Labour

Coming now to a further difficult question, that of labour costs and relations; at present we are faced with the additional burden of a major wage demand though in this respect the problems involved are not confined to the gas industry.

It is axiomatic that the prosperity of industry depends on the prosperity of its workers, and equally the converse is no less true but, unfortunately, there seems to be little acceptance of this fact generally. It is encouraging to note, however, a growing awareness amongst responsible trade union leaders that the power of trade unionism carries with it responsibility, and that its unwise or irresponsible use may do great harm to employment and the very source of wages.

The effects of sectional strikes and the use, or threatened use, of strike action as a means of achieving objectives is the most important aspect of labour relations and one which clearly calls for a fresh approach. In my view the fundamental problem is to create wider realization that increased prosperity in any and all industries depends primarily on increased productivity. This means, of course, not only an absolute increase in output per worker, but equally reduction of the labour content in current operations. The proposition demands every means of securing more efficient methods and implies from labour the abolition of harmful restrictive practices.

The true facts of our present situation, however, are that for some time past the trend has been for recurrent wage increases to outstrip rises of real production in terms of goods resulting in increased prices and higher costs of living. This process is commonly described as 'wages chasing prices,' but in reality it is more accurately described as 'prices chasing wages'—a very significant difference.

Production Methods

To quote this year's President of the Institution of Gas Engineers 'there are many new and exciting developments taking place in traditional or less traditional methods of gas-making and undoubtedly we should see great changes in the industry from this cause alone in the next few years.'

There is little doubt, therefore, that the question of production technique has to be considered simultaneously against the short-term and long-term background of the problems to which I have referred. In addition, we on this side of the Irish Sea are necessarily influenced by our situation, in which there is an inherent risk, somewhat increased today, of coal supplies being interrupted due to circumstances beyond the control of all concerned. Hence, particularly for those who have to consider new plants or early replacement of old, the problem is to decide with what types of plant and to what extent they should cover requirements without sinking too much capital into what might shortly prove to be outmoded or, otherwise less advantageous.

An analysis of recent technical papers and discussions, establishes that the possible types of fuel to be considered fall broadly into five groups, namely: (1) coal; (2) oil; (3) indigenous natural gas; (4) imported liquefied natural gas; and (5) synthetic manufacture. In Ireland we must, in the absence of contrary evidence, eliminate natural gas—at all events until results of present exploration in Britain yield evidence of commercial discoveries with comparable geological possibilities.

Imported liquefied natural gas appears to have distinct possibilities for those who are entirely dependent on imported fuel. Mr. Tate, in the course of his recent Presidential Address to the Institution of Gas Engineers, mentioned that the British gas boards are examining the possibility of transporting liquefied methane by ocean tanker from the Middle East and that in the United States it is already planned to liquefy natural gas and transfer it in refrigerated tankers from the Gulf to Chicago. At least this suggests the proposition is practicable.

Disregarding the technical aspects of distribution, which I assume will offer no insuperable difficulties, our next task is to assess the economics of the method. It is fair to assume from the details available that the imported gas, requiring refrigerated and specially adapted transport, will cost more than that of oil. On the other hand, a minimum of subsequent processing and low cost equipment for obtaining suitable calorific values may well bring the cost within practical limits. In which case, subject to assured continuity of supply and reasonable inland transport considerations, small undertakings with almost inevitably relative high carbonizing costs may find it a practical alternative means of supply. Certainly it appears to be a possibility which should be investigated. For those, however, who have to deal urgently with the immediate future, the information is as yet insufficient to give great hopes.

Synthesis gas is mentioned more to complete the picture than because useful information is at hand to warrant consideration for towns gas supply. It might well, of course, happen that by applying the knowledge gained from nuclear research to chemical change a nuclear synthesis gas of suitable characteristics for our purposes may be evolved—but here, perhaps, I am exceeding the bounds of speculative licence!

This finally leaves us with coal and oil and it seems to me that, apart from an interim period during which considerable assistance may be contributed by oil, technical opinion in Great Britain favours ultimate reliance upon coal for main carbonizing requirements.

This opinion is fortified on the one hand by the prospective

* From the Presidential Address to the Annual General Meeting of the Irish Gas Association, held in Cork on September 28-29.

† Secretary, Cork Gas Consumers' Company.

freedom of coal supplies when we pass into the period when nuclear energy reaches substantial development and, on the other hand, by uncertainty as to whether, even in the relatively near future, oil of suitable grade and price will be freely available, having regard to the increasing world demand for oil.

While this view, held in Britain, may be partly influenced by considerations of national economy, for those who have to import their coal at higher costs, as is the case in Ireland, comparisons of relative costs are altered, and the considerations of national economy have less impact. Competition, particularly with electricity, is ever in our minds and producing the cheapest therm will be a dominant factor in our future development.

Turning again for a moment to the short-term view, in the period ahead, until the position regarding coal is more definitely resolved, it seems certain that in addition to improvements in the efficiency of existing coal plants installations to meet additional gas requirements will be based on oil. These may take the form of traditional C.W.G., or the newer plants for fuel oil gasification which, for some years, in increasing measure have been employed on commercial production in Europe and in the U.S.A., as relates to high B.Th.U. gas. Costs appear to compare favourably with the cost of coal gas production under present-day conditions, and for us in Ireland such plants would provide us with a strategic standby if the ultimate trend returns to coal.

Progress

Towards the end of my address in which reference to difficulties have not been understated may I put on record the confidence shared by all in this country as to the future of the industry which is well borne out by actual experience of steady and soundly based increase in the sales of gas.

Here in the South, sales of gas have increased by some 50% over pre-war and consumers by about 30%—no mean progress in a largely non-industrialized country where we meet the keenest competition from State-sponsored electricity. Furthermore, development, virtually brought to a standstill during the war, was also prejudiced by gas restrictions and rationing over an extended period. On the other hand, our electrical friends, with whom we are on the best of terms and whose achievements command our admiration, have also advanced in a truly spectacular manner. But, lest they might have any unfounded notions of supremacy, or the decadence of gas utilization, let me add that, as compared with last year's electrical output of 1,200 mill. units, sales of gas totalled 800 mill. units on an equivalent basis and sales of coke were around 90,000 tons, equivalent to a further 800 mill. units. In addition some 12,000 tons of distilled tar were supplied for road-making purposes. These operations, based on capital investment of around £6 mill., compare with spending by our friends of no less than £60 mill.

Government Control

For us in the South there is one aspect of the competitive position which calls for notice. I refer to the effects of direct Government control in regard to prices and profits of industry run by private enterprise. This is not a phenomenon peculiar to this country, nor is this the place to discuss the general merits, or demerits, of such State policy. Unlike other sections of industry, however, we find ourselves in the peculiar position of being subject to direct intervention by the proprietor of our chief competitor, electricity—sometimes, we feel, with lack of sympathy or even discrimination. We do not claim unrestricted freedom—we have always accepted the discipline of statutory control of dividend limitation and the usual obligations of a public utility. What we seek is the same degree of freedom as our competitor, and autonomy within the framework of our existing legislation. If our price of gas were greater than that of electricity, some justification for existing policy might be advanced. That, however, is far from being the case.

6th INTERNATIONAL GAS CONFERENCE—From p. 113.

gas, coke oven gas, and finally, on peak load operation, catalytic reformed kerosene and liquified petroleum air gas. Permission is being sought to describe this most interesting station in greater detail in a later issue of the 'JOURNAL.'

The full-day trip also included an inspection of the State Meter Shop maintained by the Company. Here, in a magnificent plant built in 1953, they receive about 70,000 new meters a year and repair some 150,000. This, too, we hope to describe in detail later; but we mention in passing that the shop can make a complete re-diaphragm repair, including all material, labour, and building maintenance, for about 55% of the cost of a new meter. The net cost of the plant was $1 mill.; but about $300,000 is being saved from previous costs of dispersed operation—due mostly to reduction in personnel from 215 to 150.

Also visited was the Gas Distribution 'Shop' and offices of the Orange-Montclair District—one of 20 districts within the Company's system, and one of three districts within the Essex Division. The latter is the largest of the Company's six divisions. Of a total of 1,068,000 meters in the Company system, more than 316,000 are in the Essex Division and approximately 99,000 in the Orange-Montclair District.

The latter serves 17 Municipalities covering an area of about 79 sq. miles with a population of 359,000. The territory is principally residential and the simple family residence predominates. There are more than 16,800 gas fired building heaters in the district. This is over 11% of the 148,000 heaters in the entire Company system.

Social Events

The American Gas Association had made wonderful arrangements for the general entertainment of the visitors, a Committee of seventeen acting under the Chairmanship of Errol W. Doebler, President of the Long Island Lighting Company. Rivalling the men's efforts was a Ladies' Committee of sixteen under the Chairmanship of Mrs. Robert Hendee; but of what they specially provided we will write in our final communiqué.

For all there was a cocktail party and reception on the Tuesday, and on Wednesday a banquet and entertainment. This was indeed an enjoyable function, for though it was designated 'formal' there was a highly commended absence of formal speeches. Indeed, their place was taken by the ever-cheery Mr. Hendee introducing 'The Tops,' among whom was, of course, the leader of the British party. In his acknowledgment Mr. Hutchison stressed the fact that any of those present could be sure of a hearty welcome at any time they could visit our country. M. Brabant expressed the thanks of all, and finally Mr. Hendee had a special word for those who had done the 'lead work'—particularly Mr. Bruce McCandless, Secretary to the Reception Committee.

Last in New York was a visit to the United Nations' Facilities, with lunch provided in the river-front rooms and a full lecture tour of the wonderful building. On our way to the United States we felt we must guard against too many superlatives; but we have got over that. In the case of U.N. we can say only that the building must be seen to be believed.

On Friday night the majority of our party left by sleeping train for Niagara.

ILLUMINATING ENGINEERING SOCIETY

At the first meeting of the Illuminating Engineering Society for the 1955-56 session which took place at the Royal Institution on Tuesday, October 11, Mr. A. G. Higgins, M.SC., F.R.I.C., F.I.E.S., Barrister-at-Law, took office as President. Mr. Higgins was educated at Dulwich College and London University and studied law at the Middle Temple. He held a number of positions with the former South Metropolitan Gas Company including that of Outdoor Lighting Superintendent; he is now Assistant Secretary of the Institution of Gas Engineers.

The Society's Council has announced the following awards in connection with papers presented to the Society for the past year: Dr. W. E. Harper and Mr. A. G. Palmer, the Leon Gaster Memorial Premium, for their paper entitled 'Lighting of Hazardous and Corrosive Locations in Industrial Plants'; and to Mr. K. R. Ackerman, the Silver Jubilee Commemoration Award, for his contributions to lighting design and brightness patterns. Dr. Harper is with the Plastics Division, Imperial Chemical Industries, Ltd., and Mr. Palmer is with the North Thames Gas Board. Mr. Ackerman was formerly with the British Thomson-Houston Co., Ltd., and is now with the British Broadcasting Corporation.

Chemical Prevention of Corrosion

This article describes two processes which may be used in combating corrosion in the gas industry, particularly on structural steelwork, gasholders, and buried pipes. Both these processes may be applied to steel structures on site; to new plant in course of erection or to existing plant undergoing repair or maintenance.†

IT has often been emphasized that corrosion prevention can be achieved effectively only if the steelwork presents a thoroughly clean surface prior to application of paint or other organic finishes. L. A. Ravald, in his paper presented to the Institution of Gas Engineers in 1953, described the destructive effects of protective systems of adherent millscale on structural steelwork. Indeed, it is felt that a large proportion of corrosion problems associated with steelwork of this kind is directly traceable to ineffective methods of millscale removal employed before painting or application of other finishes.

Problem of Millscale

Millscale on steel is the product of the various hot rolling and shaping processes carried out at the rolling mill. In contrast to the underlying steel, the exterior surface of this scale is resistant to corrosive attack. It is, therefore, 'cathodic' to the basis metal and will assist in promoting corrosion of the latter should it be penetrated by corrosive agents.

Since millscale is liable to be perforated throughout the length and breadth of its surface by microscopic cracks, due in part to different rates of thermal expansion between it and the underlying steel, and since it rarely forms a continuous layer over steel, after shaping operations, its protective value is likely to be small. Moreover, the scale seldom escapes damage when the steel is handled during unloading and assembly on site. Corrosion will thus proceed on sections of the steel surface where millscale has been removed or at the base of cracks, with the result that adjacent millscale is cumulatively undermined and detached. Protective coatings such as shop coats applied over the scale in the hope of sealing pores in it will be shed with it.

Probably the most crucial problem associated with descaling is not merely removal of scale, as such, but prevention of severe rusting between the time of descaling and of final protection with paint systems. This problem exists because most economical and efficient descaling methods available hitherto must be used before steelwork is erected on site; indeed, some (*e.g.*, acid pickling) are carried out at the rolling mill or factories where building units are made. It is true that after pickling, the steelwork will often be painted with a protective primer. These coats, however, are inevitably subject to severe impact damage and abrasion on site during assembly. In any case rusting frequently occurs at joints and welds where the primer coating has been removed to allow the latter to be made.

It is felt that the lengthy process of weathering, however theoretically practicable it may appear, is now seldom regarded as a satisfactory method of removing scale. The main argument against it is that the layer of scale tends to become detached unevenly; so that when the last pieces have become detached from, say, a steel girder, severe rusting will have occurred on sections affected by earlier liftings.

Protection of Steel Structures

Hitherto, the problem of protecting steel structures, such as gasholders and frameworks of other large buildings, has in the main been approached predominantly in a spirit of simply preventing further rust formation. Difficulties arising in practice are complicated by two factors we have noted already—the presence of scale, or, after scale is removed, of severe rusting. It is a well known fact that much new steel, if showing widespread rusting after erection, is frequently wire brushed to remove rust in the belief that, if painting follows immediately, the steelwork is reasonably secure against further corrosion. In fact, however, wire brushing does not remove corrosive products from pits in or near grain boundaries of the metal; and from such localities, corrosion will develop and spread along the steel surface, loosening and, ultimately, lifting the paint in its path.

Paint, in forming a parting layer or layers between the steel and the corrosive agents in its environment, is still the principal means of preventing corrosion on building structures. Methods that are employed for scale and rust removal and for providing a sympathetic foundation for paint should be applied immediately prior to painting. The more nearly this can be achieved, the greater the chance of applying such paint to clean, rust free, steel surfaces.

Site Descaling Processes

In effect, these processes may be described as carrying out acid pickling *in situ*. Pickling solutions of high viscosity are applied by brush to steelwork already erected. They are capable of remaining on vertical surfaces until their scale and rust loosening reactions are complete. Loosened scale and rust are then removed by scraping, brushing, or hosing down with water. Since the scale varies in tenacity with type and mode of formation of steel structural members, it is difficult to generalize as to pickling times. For most operations, however, the scale will have loosened sufficiently for removal after about four and up to a maximum period of about 24 hours.

These viscous descaling solutions, the development and testing of which have only just been completed, are applied as thick coatings on steel by brushing. However, their application by spray equipment is being actively developed. After removal of scale and rust, the steelwork is rinsed with water and, after draining or drying, treatment with Jenolite 'RRN' can be applied prior to painting.

The cost of descaling and rust proofing by these methods was found, during tests on steel plate used in the gas industry, to be considerably less than half that of flame descaling without a following rust proofing treatment. Flame descaling is often thought to be the most effective method, albeit in a restricted field, for descaling steelwork *in situ*.

Jenolite 'RRN' Process

This process, based on phosphoric acid, should not be confused either with those phosphating processes which form coatings consisting of insoluble crystalline phosphates on the metal surface, or with the phosphoric acid treatment used in the well-known Duplex (Footner) process, neither of which are applicable to structural work *in situ*.

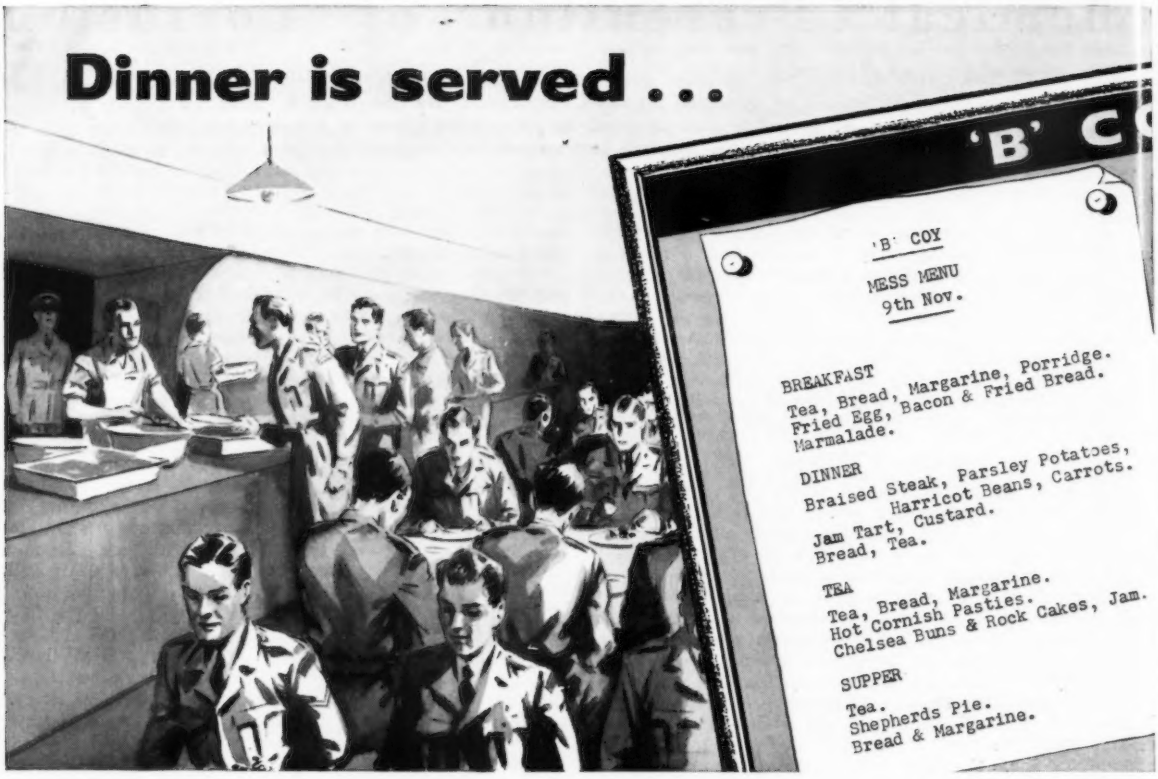
Jenolite 'RRN' performs the simultaneous functions of rust removal and deposition upon steel of tightly adherent, continuous layers of amorphous (non-particulate), water insoluble, electrically resistant iron phosphates. The coatings form barriers to waterborne corrosive agents, such as rain waters in industrial and marine atmospheres, or water in soil, while the physical nature of the surface of the coatings is such that paints and similarly applied organic finishes are strongly adherent to them. The suppression of corrosive activity necessarily suppresses also the formation of such bulky products as rust, and alkalies liberated from corrosive salts, both of which disrupt paint systems.

A key property of these phosphate coatings is in inhibiting lateral spread of rust on steel surfaces. If, due to impact damage or abrasion, the paint system on, for instance, a steel girder is detached locally, rusting commencing at this point can spread out along the entire surface of the girder detaching the paint as it advances. The phosphate coating, in inhibiting this tendency, limits rusting to the initial point of damage.

These properties of forming barriers to corrosive agents, effecting tenacious adherence of paints and similar finishes, suppression of corrosion with consequent prolongation of paint life, and limiting lateral spread of corrosion from sites where impact damage or abrasion has occurred, are some of the means whereby Jenolite coatings ensure considerable enhancement in

† By C. D. Coppard, Jenolite Limited, 13/17, Rathbone St., London, W.1.

Dinner is served . . .



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Heated by concentric burners, controlled by separate taps. Choice of bower-barffed cast iron or stainless pans with hinged or lift-off covers as required. In capacities from 15 to 30 gallons.

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(Shown left) is a combination unit of a No. 93HO Boiling Table with an "open bar" hotplate and a No. 93HS Boiling Table with a "solid top" hotplate. Incorporated in the potrack is a Main 225 griller which is an optional extra. Extensive range of other designs of boiling tables available.

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overall efficiency, life, and consequently economy, of anti-corrosion protective systems applied to steel structures, whether they be exposed to industrial or marine atmospheres, submerged in water, or buried in soils. It cannot be too strongly emphasized that Jenolite treatments do not replace wholly or in part existing systems of protection. They are essentially preparatory treatments which ensure and extend the values and useful lives of such systems beyond estimated limits.

Application of these processes may be by tank immersion, spray equipment or brushing. Where possible, the steel may be treated by the first two methods with heated solutions, since dipping and spraying are, on the whole, quick methods. Installations exist where processing tanks are operated with capacities of many thousands of gallons of solution. In other cases, where the nature of work (as here) demands treatment *in situ*, the process may be applied by brushing. Brushing applications employ solutions of high concentration.

Unlike crystalline phosphate coating processes, where the crystalline structure of the coatings are formed and completed in processing tanks, the Jenolite coating is formed in air during the drying stage after rust removal, and may not reach maturity until some hours after becoming touch dry. In the immature state the coating may be injured by water or condensate. However, it has been found that these coatings will mature under primer paints. The primer, therefore, may be applied soon after the touch dry condition is reached, and in fact allows the coating to reach full maturity while at the same time protecting it from moisture.

Where corrosive conditions are severe—as on ships' hulls or on buildings affected by industrial atmospheres—the 'RRN' treatment may profitably be augmented by use of Jenolite 'Chemical Sealer.' This material, which has been developed specifically to ensure that the Jenolite coating can mature under adverse site conditions, forms in conjunction with the phosphate coating a strongly rust-resistant foundation key for the subsequent paint system. The sealer is recommended as an addition to, and not instead of, primer coats.

Gasholder Problems

The problem of adequate protection of sidesheets on water sealed gasholders is that on certain lifts they are exposed to intermittent immersion in low salinity sealing water, frequently rain water. Variable atmosphere/water attack of this kind, while not as serious as that sustained in high salinity waters (as by ships at sea) may tend nevertheless to be severer than continuous immersion.

One of the chief troubles experienced with paints under these conditions is formation of blisters caused by overlong immersion. In the case of top and/or undercoats only, blistering, the cause may lie in incompatibility between two contiguous paint coatings, resulting in faulty adhesion; or finishing paints may be applied to surfaces which are contaminated. If permitted to go unchecked, or under particularly severe conditions, blistering may affect the entire paint system and, ultimately, permit the steel to come under attack. Here again, a phosphate coating, affording maximum adhesion, will mitigate blistering and subsequent flaking; and will restrict the lateral spread of rust consequent upon such local paint breakdown.

Buried Pipelines

No matter how excellent a pipeline protective coating may be, it is almost inevitably damaged while being laid in the ground; as the earth covering is dropped on to it; or, subsequently, owing to earth movements or movement of pipe itself. Damage to protective coatings may further be increased as a result of deleterious effects of soil waters. In waterlogged soils, such as clays, damaging effects of water may be very extensive and are liable ultimately to set up widespread corrosion on the pipe. In such circumstances, moreover, the protective coatings themselves are likely to become permanently waterlogged.

Soil waters invariably contain dissolved salts, and thus possess a high electrical conductivity. Corrosion under these conditions is essentially an electro-chemical process: differences in electro-chemical potential are set up at interfaces between the pipe and water which has penetrated through the protective coating. Due to variation in magnitude between these potential differences, electric currents are induced to flow, tending to even out these differences. Circuits through which these currents flow consist principally of the pipe itself and the electrically conductive soil water. In the pipe, the current consists simply of a stream of electrons, but in the soil water the current comprises positive and negative ions moving in opposite directions. The positive ions move towards cathodes, *i.e.*, negatively charged sites on the metal; the negative ions move towards anodes, positively charged sites on the metal. At these points ions may discharge or form.

At anodic sites, therefore, metal from the pipe may pass into solution as positive ions instead of negative ions from soil water discharging. The passage of metal into solution in the form of ions is the basic reaction involved in the electro-chemical corrosion of metals. The value of Jenolite 'RRN' in combating this type of corrosion is readily apparent. Coatings formed on steel by its use have, in fact, been widely used to protect ships' hulls. In particular, the high electrical resistance of the phosphate coating results in a considerable reduction in the area and the number of sites on a given piece of piping which are susceptible to this type of corrosive attack. Moreover, since the mature coatings are water insoluble, and impermeable, corrosion would be limited even in the case of widespread paint failure.

Cathodic Protection

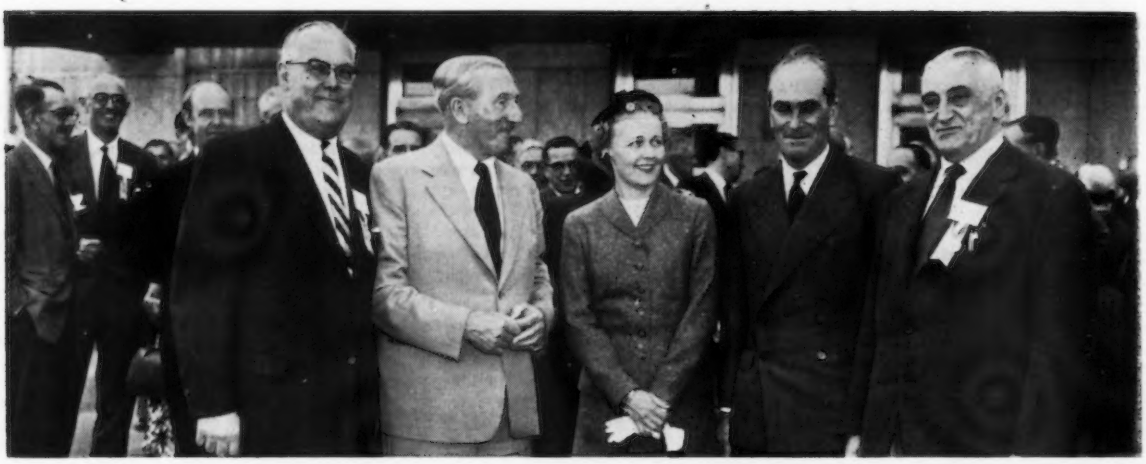
As previously indicated, damage to varied pipeline protective coatings is almost inevitable. Counter measures to make good damage so formed to pipes *in situ* are desirable, therefore, to prevent future corrosion. Since the corrosion process is electro-chemical, methods involving electro-chemical principles may be used to offset corrosion which would otherwise ensue. The principle exploited for this purpose consists of an arrangement whereby a potential is applied to the pipe so that it opposes the tendency of the metal to pass into solution at any site. Protective systems based on this principle are known as 'cathodic protection,' since the applied potential renders the pipe everywhere cathodic towards the soil water. As the pipe is made cathodic, some other device must be made anodic. Provision is made for this either by attaching more readily corrodable metals (anodes) to the pipe, or by causing a current to pass between anodes and the pipe.

There are consequently two basic systems used for providing protection by electrical methods. One is by the use of metals which are anodic to the pipe, the commonest of which is a magnesium alloy. These are connected by an insulated conductor to the pipe; so that a circuit is formed between them and the pipe by the conductor on the one hand and by the damp soil on the other. The potential difference set up between this anode and the soil water is sufficient to cause electric current to flow from it to the pipe—thus opposing the flow of current *from* the pipe, and tendency arising therefrom of the metal of the pipe to dissolve. This process involves the passage of metal from the anode into solution, which therefore dissolves (corrodes) in lieu of metal from the pipe. Such anodes are consequently termed 'sacrificial' anodes.

Alternative systems consist in using anodes which may be non-corrodable (*e.g.*, graphite), between which and the pipe an electromotive force is impressed by means of a battery, or other source of supply, such as a transformer and rectifier system supplied from an alternating current source. The latter system is usually more desirable: it is more versatile and easily adjusted than the former and is generally the type preferred where a power supply is readily available, or can be installed economically.

Now while in dry soils this method of protection is not so widely applicable, in wet soils, as in this country, it is a very useful system of limiting electro-chemical corrosion. An important factor limiting its more widespread adoption is one of costs. It is very probable, therefore, that the Jenolite 'RRN' treatment would enable less expensive cathodic protective systems to be employed to protect buried pipelines and other structures than has been possible hitherto.

It has been noted that the phosphate coating reduces the area of metal susceptible to electro-chemical corrosion. Also, while without this protective coating corrosion on pipelines requires a rising quantity of current in proportion to the increase in area of corrodable metal exposed due to progressive protective coating failure, the 'Jenolized' surface actively resists lateral spread of corrosion.



Left to right the group includes Mr. Robert W. Hendee, Sir Harold Smith, Mr. W. K. Hutchison and Dr. Mario Boselli, President of the International Gas Union.

International Gas Union in Pictures

The recent conference in New York gave gas industry personalities of all nations the chance to make and renew friendships

These pictures were taken at the Sixth International Gas Union Conference, held at the Hotel New Yorker in September. On the left, Mr. W. Boden, Technical Manager of Stanton Ironworks Co., Ltd., enjoys a joke with Mr. G. E. Currier, Deputy Chairman of the North Eastern Gas Board, after the day's sessions.

Mr. Walter H. Davidson, Vice-President, Transcontinental Gas Pipe Line Corporation, Houston, Texas, presided at the transmission-distribution session of the Conference. Mr. W. K. Hutchison, President of the Institution of Gas Engineers, was Chairman at the parallel session on gas production.

Below: Mr. Robert W. Hendee, Colorado Springs, former President of the American Gas Association and retiring President of the International Gas Union, congratulates Dr. Mario Boselli, Milan, on his election as current President of the I.G.U.

Above: Participating in the conference were Mr. C. S. Stackpole, Managing Director, American Gas Association; Mr. F. M. Banks, President, A.G.A., and President, Southern California Gas Company; Mr. Robert W. Hendee; Dr. Mario Boselli, the new President of the International Gas Union; and Mr. E. W. Doebler, President, New Island Lighting Co., Mineola, New York, who headed the programme committee for the conference.

Officers of International Gas Union met with Ambassador Mr. James J. Wadsworth, Deputy U.S.A. Representative to the United Nations. Left to right: Dr. W. T. K. Braunholtz (I.G.E.), Honorary Secretary of the International Gas Union; M. Touwaide, Belgium, General Secretary, Mr. Wadsworth; Dr. H. Kaun, Germany, Vice-President at Transmission-distribution session; and Bengt M. Nilsson, Sweden, Vice-President of the I.G.U.

Outside the Hotel New Yorker this group of delegates posed for a photograph. Many of them carried their own cameras or 'movie' cameras.

THE PRE-TREATMENT OF COAL FOR CARBONIZATION—From p. 118

The yield of surplus gas is 5,400 cu.ft. per ton (485 B.Th.U. per cu.ft.).

Baumco and Rammler Processes

Processes originating in Germany for the production of hard coke from lignites and other non-coking coals which have recently attracted attention are those of Baumco and Rammler. These are both two-stage processes which involve carbonization first at low temperatures and subsequently at higher temperatures. In the Baumco system, not yet operating commercially, semi-coke resulting from the first stage treatment is blended with up to 10% of coking coal and up to 10% pitch and the mixture is briquetted and carbonized at high temperature, with both direct and indirect heating, to produce hard coke suitable for metallurgical, industrial, or domestic use depending upon the heating conditions in the high temperature stage. In the Rammler process, under development, powdered lignite is briquetted without a binder and the briquettes containing 12% moisture are dried and carbonized by step-wise heating in a vertical chamber. Heating in the upper section is to 600°C. and in the lower to 1,100°C.

Bricoke Process

An interesting method of producing coke suitable for use in metallurgical cupolas, from Western Australian semi-bituminous coals has recently been described by Broadbent, Donnelly and Platell. These coals show high shrinkage of 20% over the temperature range 500 to 1,000°C. Briquetting with pitch of the coals or of low-temperature char produced from them, followed by carbonization at high temperatures gives a coke product which is shattered and weak due to the high shrinkage. Strong coke can be made, however, by first carbonizing such coals to at least 800°C. to ensure adequate preshrinkage, and then briquetting the char with 8 to 10% of pitch and carbonizing the briquettes to 500°C. This so-called 'high-low' technique has been shown to give a product 'bricoke' of high strength which has been tried with promising results in a metallurgical cupola.

Ferrocoke

A process of making metallurgical coke of high strength from gas-coals which are normally not suitable, by blending them before carbonization with small iron ore, has recently been introduced in Germany. The method is particularly interesting because not only can a wider range of coals be used for coking but small sized iron ores or concentrates rich in iron, which are of too small size to be satisfactorily processed in sinter plants or blast furnaces, can be utilized. Blends of gas-coal with up to 30 or 40% of iron ore will produce a strong coke containing iron partly in its original oxide form partly as lower oxide, and partly as metallic iron. Ores used should be in the Fe_3O_4 state; higher oxides oxidize the coal during coking and reduce its coking power if additions higher than about 5% are used. Experiments at the Fuel Research Station, London, have indicated that additions to good quality gas-coal or coking slack of up to 7% of cinder, resulting from the roasting or iron pyrites, gives cokes of slightly increased shatter strength but of higher abradability.

The use of Ferrocoke in blast furnaces should permit of increased throughput due to increased blast penetration and to pre-reduction of ore added to the charge. Material too small for use in the blast-furnace cannot be disposed of in the normal market but can be gasified economically to produce lean gas as a replacement for rich gas for the underfiring of coke ovens.

TESTS ON THE COKING PROPERTIES OF COAL—From p. 122.

it. The observation appliance consists of a microscope body equipped with a special objective and a stationary eye-piece which is provided with a division plate with co-ordinates. A screen for observation is fixed on the side, while a connection piece for fixing a Leica camera is provided in the rectilineal prolongation. The microscope projects the image of the ash body in its place in the furnace as a fivefold enlargement on the observation screen or camera.

The ash which is made at a definite temperature and worked up according to the rules of the German Industrial Standards (DIN) is shaped by means of a hand press into the cylindrical form required; water is used as a binding agent. The amount required for a determination is approximately 30 mg. The heating up is done in such a way that, as from 1,000°, a rate of heating of about 10° per minute is applied. Regulation is made by means of a hand Rheostat.

During the observation we distinguish four different phases:

(1) *Sintering*
This is the point at which the whole shape of the ash test body remains intact, but will become smaller in its dimensions.

(2) *Softening*
The initial deformation point is the temperature at which the test body will alter its shape by swelling and lose its former proportion.

(3) *Melting Point*
The hemisphere point = softening point is the point at which the test body has completely lost its original shape and has fused down to a hemispherical mass.

(4) *Fluid Point*
The fluid point is the point at which the ash has completely fused away on its ground plate.

The knowledge gained about the behaviour in the fusing point apparatus will only give some hints as to the possible behaviour of the ash or slag in practical operation. It must be borne in mind that the individual components of the ash (iron, aluminium, calcium, silicon, sodium, etc.) are present in an intimately mixed state, and an even granulation is given by the preparatory treatment. In practice also the distribution of the individual components will, beside the influence of the gas phase, play an important part. Despite this, the above-mentioned method is suitable to provide serviceable values.

INDUSTRIAL RELATIONS

In an Address on 'Industrial Relations' to the Stationers' Summer School at St. Peter's Hall, Oxford University, on October 1, Mr. J. R. W. Alexander, Executive Chairman of the Gas Officers' Guild and Immediate Past President of the Institute of Arbitrators, said that the Press this year had rendered a notable service by devoting so much space to industrial relations problems and their solution. Factual information and authoritative opinion were essential to an understanding of the difficulties which confronted the British system for the settlement of the wages and conditions of employment by joint voluntary negotiation.

Joint voluntary negotiating machinery could not be regarded as complete, he said, if it did not provide for arbitration in the event of the parties being unable to reach agreement. Moreover, in such event, the parties should be ready and willing to go to arbitration at once. If reluctance to arbitrate were removed, the establishment of an Arbitration Appeals Tribunal—as recently proposed by the President of the Trades Union Congress—would be justified as a matter of expediency.

Arbitration was intended to be flexible, expeditious and, above all, final. In the settlement of industrial disputes, arbitration did not proceed upon precedent or directives, neither did the arbitrator have to give reasons for his decision. Departure from this procedure would be inconsistent with the British industrial relations system and would lead to delay and lack of finality. Almost invariably, the unsuccessful party would feel obliged to appeal in order to satisfy its constituents and, in the end, an external decision would have to be accepted. It would not be more agreeable if reference to precedent, or the stating of reasons, or the making of different awards, gave further grounds for argument and discontent.

It had not been shown that the Industrial Court (to which the parties may agree to refer their difference) and the Industrial Disputes Tribunal (to which a dispute may be compulsorily referred by the Minister of Labour) did not satisfactorily discharge their primary function. That was, not to solve the whole of an industry's labour problems, but to determine a specific claim upon which the parties could not themselves agree. What was needed, if agreement eluded the parties, was the resolve always to resort to arbitration and to implement the award. Then and only then should the issue of strike or lock-out be allowed to arise.

Members of the Wales and Monmouthshire Section of the I.G.E. at the Nantgarw coking plant.

'Wales and Mon.' Section at Cardiff

THE Sixth Annual General Meeting of the Wales and Mon. District Section of the Gas Engineers was held at Cardiff on Thursday, October 6. Members were welcomed by the deputy Lord Mayor of Cardiff, Councillor William Groves, who said he was interested to learn that it was the Jubilee year of the section because this was Cardiff's 50th year as a city.

Presenting the report of the management committee, the secretary, Mr. J. Powdrill, pointed out that not one recommendation had been received from the district section for the Octavius Thomas Memorial Prize which is awarded each year to the most worthy student of the year taking a course in the Institution of Gas Engineers Education Scheme. He felt that greater interest could be taken by members in this very worthy object.

The Chairman's Address

The principal item on the agenda was the address by the retiring chairman, Mr. J. H. Chapman, which is reported on page 127.

Proposing a vote of thanks to the chairman, Mr. W. T. Hird (Distribution Engineer, Wales Gas Board) said he was in a position to know the quality, the quantity and the worth of the work which Mr. Chapman had done for the gas grid in South Wales. He had given a thoughtful address which reviewed the activities of the Section and should give members much satisfaction and inspire them to continue to work for its success.

Mr. Chapman's history in the gas industry, which was well known, was an exceptionally diverse one. Starting with a major engineering contractor he worked with a London gas company and a lighting company before going to Swansea in 1924. He had given 31 years of invaluable service to the gas industry in South Wales. The amount of work he had done for the gas grid was tremendous. There was not a yard of main laid in the western section or to be laid right down to Pembrokeshire that had not been the result of Mr. Chapman's own detailed and comprehensive work.

Seconding the vote of thanks, Mr. A. Pickard (Swansea) commented: 'I know of no one who is more respected by his colleagues.'

New Officers

MR. J. F. LLOYD (Wrexham) was elected chairman for the ensuing year and proposing his election, Mr. O. P. Cronshaw told members, 'He is known personally to us in North Wales. He is very modest and does not stick his neck out, so I am sure he will not get his head chopped off. He will keep his head with dignity.'

After his installation by the retiring chairman, Mr. Lloyd said: 'I hope I will be able to carry out my duties with the success to which you have been accustomed.'

He then presented to Mr. Chapman a gold wristlet watch as a token of the Section's thanks for his service.

MR. A. H. DYER (Newport) was elected senior vice-chairman and proposing his election, Mr. J. F. Rust said: 'I have very great pleasure in proposing Mr. Dyer. I look upon him as one of my boys who has made his mark in the industry. He joined us in Newport 37 years ago straight from High School. For the past 16 years he has been my deputy. No man has had a better, more reliable and loyal deputy than I have had. I am sure you will all like to congratulate him on his appointment as manager and general engineer of the Newport undertaking as from January next.'

MR. IVOR W. THOMAS (Aberystwyth) was elected junior vice-chairman on the proposition of Mr. W. Clark-Jackson (Neath), seconded by Mr. F. Dupont (Brecon).

Visit and Luncheon

Prior to their visit to the plant members were given a comprehensive description of the coke oven and by-product installation at the Nantgarw plant of the National Coal Board.

At the luncheon which followed the meeting, Dr. A. B. Badger, Industrial Relations Officer of the Gas Council, proposed the toast to the Wales and Mon. Section.

'You are a professional body,' he said, 'and the position of professional people in this country is changing every day. That of the gas engineer has been changing by the emphasis of the distributive side of the industry.' It was also changing by the confiscatory taxation of the middle class of this country. The skill, training and education which brought them together and made production possible must be an element of greatest value to society. Another change was increasing competition. They were no longer the monopoly they were 50 years ago. Electricity, oil and other types of fuel were competing very seriously with them.

He hoped when speaking publicly that they would all be loyal to the industry which provided them with their bread and butter because there was a tendency among young people today to consider far more carefully than in the past which industry they should enter.

Replying, Mr. J. F. Lloyd said professional bodies such as theirs could do so much to spread knowledge based on experience to help the industry to which its members belonged. There had been some remarkable developments in the past year and he hoped they would be privileged in due time to have first hand accounts of some of these works.

Mr. J. F. Rust, General Manager and Engineer of the Newport Undertaking, proposing the toast to the City and Port of Cardiff, said that as fuel technologists they would be interested to know that the local Chamber of Trade were pressing for facilities at Cardiff docks for the handling of liquid methane from the Middle East.

The Lord Mayor of Cardiff, Ald. Frank Chapman, responded, and Mr. A. H. Dyer, Newport, proposed the toast to the guests. Replying, Mr. M. J. Stradling, chairman of the Institute of Fuel, South Wales Section, called for good will and co-operation between the gas and oil industries.

Irish Association Annual General Meeting

THE annual general meeting of the Irish Gas Association was held in Cork on September 28 and 29 with the Secretary of the Cork Gas Consumers' Company, Mr. Seaghan L. Doyle, as President and host with his Company at a dinner at which there were 170 guests. A civic welcome was extended to the 100 members attending the meeting by the Lord Mayor of Cork, Alderman P. McGrath. A golf tournament, visits to the Cork gasworks, to Blarney Castle and to Cork Harbour were on the social side of the agenda.

THE LORD MAYOR OF CORK opened the meeting by extending to the visiting members the warmest welcome. 'At the present time,' he said, 'electricity and gas are running neck and neck. The change over to electricity for public lighting in Cork years ago did not have any effect on gas production because the Cork Gas Consumers' Company has never ceased to make progress and to expand. The Company is the source of great benefits especially to the people of the newly built-up areas. These people are taking full advantage of the gas service for cooking.'

Mr. E. T. Mahony, Chairman, Cork Gas Consumers' Co., being indisposed, MR. J. RONAN, a fellow director of the Company, deputized for him in offering another welcome to the members. MR. S. L. DOYLE then read the presidential address, an abstract of which is published on p. 129.

MR. N. J. ROBINSON, Alliance and Dublin Consumers' Gas Company, retiring Hon. Secretary of the Association, in thanking Mr. Doyle for the address, said the Association never had such a popular President. He had been particularly struck by the poise with which the President had dealt with the respective merits of coal and oil.

Growing Membership

After Mr. Doyle had been invested with the Presidential medal of office by Mr. Ronan, MR. ROBINSON presented the Committee's report, in which it was stated that during the past year their membership had grown to 133, and their accounts showed a surplus of nearly £145 for the year's working, bringing their credit balance to £806. Their funds were satisfactorily invested.

Mr. J. J. O'Mahony then read a paper prepared by Mr. A. L. Allen and himself on 'Some Aspects of Gas Distribution.' In a discussion after the reading, the following contributed: Mr. E. M. Edwards, Wales Gas Board; J. W. Young, Manager and Engineer, Lurgum Gas Department, and Mr. J. A. Denbyshire, Bangor.

The election of officers for 1955-56 resulted as follows:—President, Mr. J. Lusted (Strabane); Senior Vice-President, Mr. J. K. Cantwell (Wexford); Junior Vice-President, Mr. J. MacDougall (Derry); Committee—Northern Area: Messrs. J. W. Young, G. Robins, F. S. Clegg and G. Walmsley; Southern Area —Messrs. J. O'Regan, S. J. Doyle, F. K. Thomas, and S. J. Kneeshaw; Secretary (Northern area), Mr. W. H. Ainsworth; Auditor, Mr. W. Cole.

Much to the regret of the members, pressure of business prevented Mr. N. J. Robinson from continuing in office as Hon. Secretary of the Association, but he promised his close co-operation in all matters including his contact with the Irish Government and with the British Coal Board. The post was not filled at the meeting.

The Dinner

There were nearly 170 guests at the dinner given by the President and the Cork Gas Consumers' Company at the Imperial Hotel. The guest of honour was Mr. P. J. Crotty, Parliamentary Secretary to the Minister for Industry and Commerce who was unable to be present. Guests other than those later mentioned as speakers to the several toasts included —Messrs. J. O'Connell, Chairman, Cork Master Builders' Federation, Mr. O. Callanan, Cork County Manager, Mr. J. Sutton, President, Irish Association of Chambers of Commerce, Mr. J. S. Smith, O.B.E., British Ministry of Fuel and Power, Mr. J. C. O'Connor, President, Cork Chamber of Commerce, Mr. T. F. Doyle, Vice-Chairman, Cork Harbour Commissioners, Mr. E. Gayer, General Manager, Cork Harbour Commissioners, and Mr. T. H. Donovan, General Manager, Munster and Leinster Bank, Ltd.

The toast of the Irish Gas Association was proposed by MR. CROTTY who said the spectacular developments in the field of electricity for light and power in recent years in Ireland had caused the importance of the gas industry in the national economy to be overlooked. Yet the gas industry in Ireland provided good, well-paid employment for over 5,000 persons spread throughout the cities and towns.

In his own town of Kilkenny, the local authority showed its appreciation of the gas industry by contributing £9 to £10 per house towards the extension of gas mains in their new housing estates in order to make the valuable gas service available to tenants.

Because gas was an essential service, successive Irish Governments had found it necessary, perhaps obligatory, to review prices charged for gas. It was remarkable that the representation of consumer interests at such reviews by the Prices Advisory Body was somewhat small. At a sitting in Cork, the Chairman of the Body had commented that very little assistance had been received from consumer interests. They might assume from that that consumers were satisfied that the prices charged were fair.

'Due to the very steep increases in the price of coal over the past few years, and the increases in wages, salaries and other costings, one would naturally expect a much greater increase in the price of gas than there has been.

'I am very pleased to note that quite a big proportion of the effect of these increases was absorbed in your improved production techniques which were developed by the bigger undertakings.

'These larger undertakings are always willing to pass on the results of their investigations to the small units which would not have the facilities nor could afford the cost of this research work.'

MR. N. J. ROBINSON, replying to the toast, said Ireland was progressing towards more and greater industrialization. It was a country without great fuel resources of its own, and it had almost reached the end of its potentialities in the development of water and peat power for the generation of electricity. At that point the country would have to import still more fuel. The most efficient form into which that fuel could be converted for use was gas which had the advantage over electricity in every sense and to a degree not brought to notice sufficiently.

After MAJOR G. ANDERSON had proposed the toast of the City of Cork and its Gas Company and the Lord Mayor and Mr. Doyle, Mr. P. J. Sheehan, Engineer, Cork Gas Co., proposed the toast of Kindred Associations and the Guests. He spoke with particular reference to the Institution of Gas Engineers in which were found men of great stature.

Institution Greetings

MR. E. M. EDWARDS (Wales Gas Board), replying, conveyed the greetings of Mr. W. K. Hutchison, President of the Institution of Gas Engineers, then attending the conference of the International Gas Union in New York with Dr. W. T. K. Braunholtz and other members of the Council. He conveyed the good wishes of the Institution to the Irish Association. Mr. Edwards declared that the coming ten years would see fundamental changes in the gas industry in this and other countries all over the world. Their Institution had to play its part in educating young men in the new processes which had to come if the industry was to continue to develop.

It had been his privilege during the past six years to view the industry in various parts of the world, in the United States, in Canada and in different European countries, and he was convinced that the Institution had a very important task ahead.

In a brief description of the work of the Wales Gas Board, Mr. Edwards said that its 105 undertakings catered for an area of 8,000 square miles and they had 8,850 miles of mains. They had come to the conclusion that despite distances and terrain difficulties, the best approach to their distribution problems lay in large scale integration.

MR. F. K. THOMAS, Limerick Gas Department, proposed the toast of 'The Press' and MR. THOMAS CROSBIE, Editor in Chief, *Cork Examiner* replied.

MR. F. S. CLEGG toasted 'The Ladies' and Mrs. Farrington, wife of Mr. S. W. Farrington, Cork City Engineer, replied.

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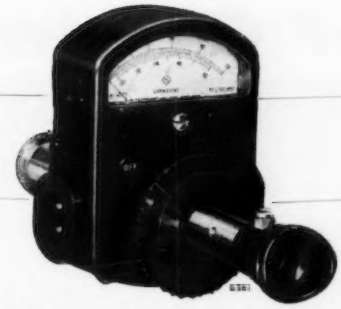

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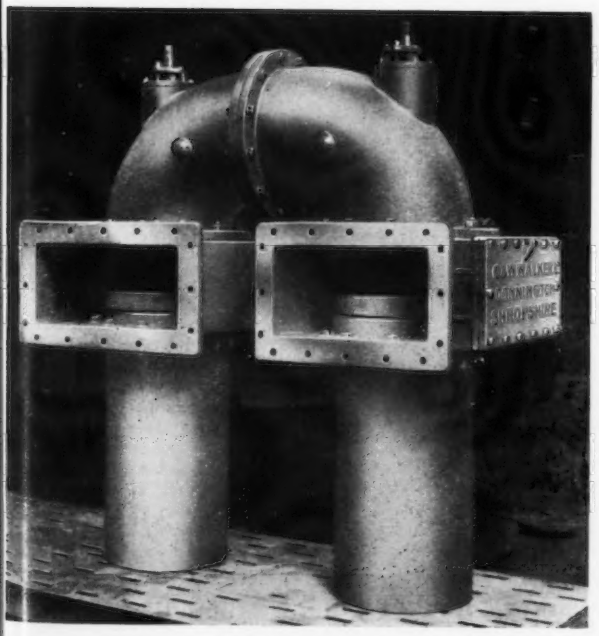

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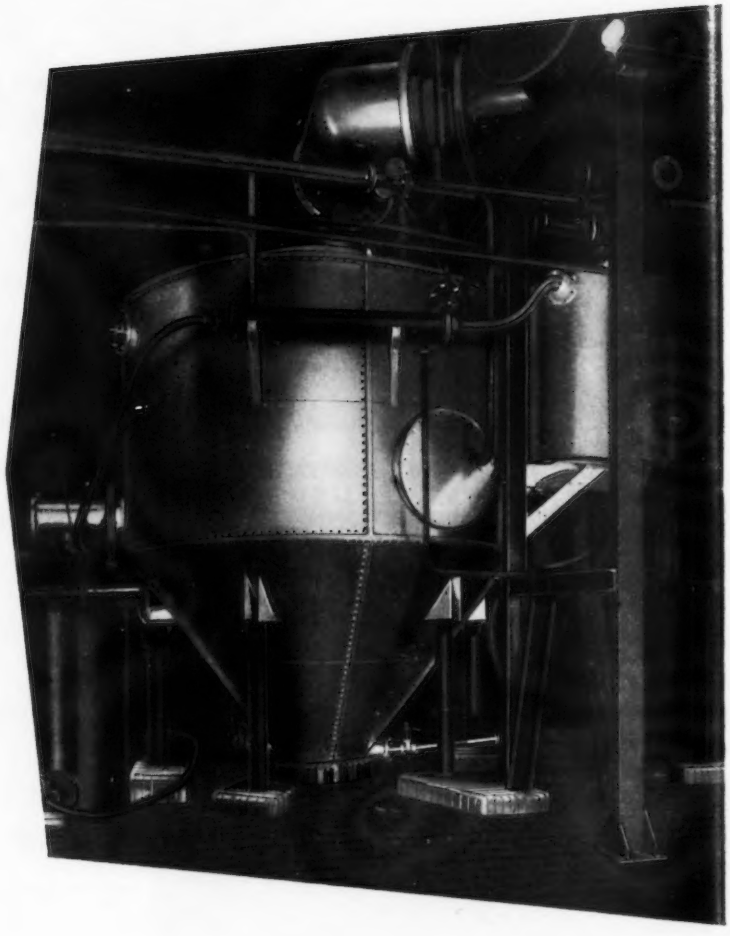

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FIRST AID: LIVERPOOL FIRST

The North-Western Gas Board, with their Liverpool team, won the Challenge Trophy in the gas industry's fifth National First Aid Competition at the Conway Hall, London, on Tuesday, October 4, 1955. They were the original winners in 1951 and have never been out of the first three. North Thames Board were runners-up and Eastern, winners of the last two competitions, third.

The trophy and plaques for the first three were presented by Mr. Henry F. H. Jones, M.B.E., Deputy Chairman of the Gas Council. He said they all heard or read something of the alleged decline in volunteering to do things for others. People who think like that should come to the competition and see the extent to which industry (in this case the gas industry) was prepared to give time simply to help others. First aid work was well worth encouraging. Many more took part in recent years and the standard continued to improve.

The North Western Gas Board team are seen here with the trophy, held by the captain, Mr. J. A. Clague. Right of Mr. Clague is Mr. P. D. Welman, Chairman of the North Western Gas Board and Mr. C. H. Leach, Manager, Liverpool Group.

GAS CONSULTATIVE COUNCILS

Coke Demand Effort

A letter from the South Western Gas Board to the area Consultative Council stated that the Board would do everything in its power to supply an adequate quantity of suitable coke to all parts of the area in the coming winter.

The Board had undertaken a stock-building plan of 60,000 tons, which was a larger quantity than ever before, but coal production had fallen, partly as a result of the miners' strike in Yorkshire, and deliveries were cut by the rail strike. The Board's coal deliveries were over 53,000 tons short of allocation; the stock of coal was 25,000 tons short of the target, and coke production was 20,000 tons less than estimated.

Direct Supply

The merchant trade was being encouraged to take coke in bulk and bag it on their own premises, thus reducing congestion at gasworks. It was hoped that the Board, as a supplier of coke direct to consumers, would be able to meet orders promptly during the normal winter demand.

The Board pointed out that it was not possible, but if it were, the cost would be completely out of proportion, to organize a distributive machine that was capable of making prompt deliveries during critical peaks of demand. 'During such times as these delay is inevitable.'

On coke burning appliances, particularly modern domestic grates, many of the hundreds of thousands that had been purchased were commonly used for coal, and it was when such consumers found they were unable to obtain sufficient coal that they ordered coke, thus intensifying the demand.

It was put forward in the letter that domestic consumers were entitled to a fixed quantity per year and they were encouraged to buy that quantity during the summer by price inducement. If the summer was bad the tendency was to use the coal then. During the winter coke was relied upon.

Popularity of Gas in Scotland

'Gas is very definitely in the running for national business and is not, as a whispering campaign would suggest, on the way out.' Provost Hugh Ramsay, Chairman of the Aberdeen and North District Scottish Gas Consultative Council, said this to members last week. Gas improvements now in progress in their area would help the city and included the provision of a new gasholder at a cost of £750,000.

The effort of the industry to ensure maximum returns was outlined by Mr. H. S. Milne, Divisional Gas Controller, who said that gas flue dust from the retorts, formerly regarded as waste, was now being sold at more than £100 per ton. The Gas Board's mobile showroom was later inspected by Council at Pittodrie. This unit is being used to demonstrate new gas appliances and has been particularly useful in this connection.

Mersey Gas Link

For some weeks lengths of steel pipe lines each 18 ft. long have been placed in position in the £8 mill. tunnel under the Mersey which links Liverpool with Birkenhead.

Now the last length has been placed in position and in the lower half of the tunnel which is not yet being used for traffic the pipe line is being completed and will in due course provide the necessary link up for gas supplies for the area.

The cost has been in the region of £155,000, and is part of the North Western Gas Board's outstanding current scheme. It will when completed enable Liverpool group and Wirral to exchange supplies.

Gasfitting Examinations, 1955

The results of the examinations in gasfitting conducted by the City & Guilds of London Institute as part of the National Classification Scheme for Gasfitters, were recently announced. In the area of the Northern Gas Board, 29 candidates sat the Final examinations, 18 of whom passed both the written and practical tests. In the Intermediate examinations 55 candidates sat, 35 of whom passed. These results in the Northern area represent a 62% pass which is understood to be much higher than the national average.

A revised quotation of £1,589 by the Yorkshire Electricity Board for the conversion of the remaining 53 gas lamps at Sutton-in-Craven to electricity, which has been received by Skipton Rural Council, is to be submitted for Ministerial approval.

ASCOT IN COPENHAGEN

On the Ascot stand at the British Trade Fair in Copenhagen currently being held until October 16, were heaters operated from both town gas and LP (bottled) gas. 'The balanced flue multipoint heater type 715 was shown for the first time in Denmark and attracted a considerable amount of interest. Picture shows, from left to right, G. H. Rosam, Group Overseas Manager; A. H. Edney, Group Advertising Manager, Ascot Water Heaters, Ltd., talking to Erik Hvidd, Manager of their Danish Representatives, Dansk Gas Services.

Improved Domestic Heat Economy

Emphasis was given to the problem of domestic heat economy, both in heating efficiency and in heat retention, by Mr. A. C. Hazel, a member of Hurseal, Ltd., when he was giving his impressions on 'New Heating Ideas at Home and Abroad' to representatives from the Press, at a recent reception at the Building Centre in Store Street, London, W.1. Mr. Hazel said that experts from the company had devoted considerable time to the study of domestic heating both in Europe and in the United States, but most particularly in Scandinavia. Any advances that had been made independently in other countries had been adapted to suit the British climate.

The most novel item on show was a stick-a-seal plastic foam weather strip which, it was claimed, can be applied to doors and windows as easily as sticking on a stamp. The basic material is foam rubber which is coated with a paper-protected sticky surface. It is to be sold in rolled strips at a price which is said to be within the reach of all housewives. It is expected that when this material becomes more widely known, many more householders will be induced to save fuel by draught-proofing their homes.

The focal point of the exhibition was, as might have been expected, a domestic fire—the Hurseal Hurdapta. As one of several free-standing fires that have recently arrived on the market, the Hurdapta is representative of a notable domestic revolution. It has been tested by the British Coal Utilization Research Association and is claimed to be 60 to 70% more efficient than the old fashioned fireplace and about 10% more efficient than any other free-standing fire. It has also been officially approved by the Ministry of Fuel and Power as ideal for smokeless zones.

Choice of New Appliances

Tenants of future housing estates built by Glasgow Corporation will have the choice of cooking by gas or electricity. At present connections are made only for gas appliances. The new arrangement, now approved by the Corporation's Housing Committee, arises from representations by the South of Scotland Electricity Board. The Electricity Board have offered new terms, which the Committee have accepted. The standard charge to the Corporation for electricity connection is reduced from £15 to £5 per house, and the Board undertake to maintain each electric cooker and each electric wash-boiler per house at a cost of 10s. a year. In each house the Corporation are to install an electric cooker circuit and a cooker control unit in addition to the piping for a gas cooker. It will be for the tenant then to decide whether electric or gas appliances should be supplied.

Gas Prices Rise in Ulster

Gas prices throughout Northern Ireland are expected to rise between 6d. and 1s. per thousand cubic feet as a result of recent increases in the cost of coal. On September 23 Belfast Corporation Gas Committee recommended an increase of 6¼d. to operate from the first meter reading after October 3. The increase, if approved, will be the second in three months, as a similar rise came into operation on July 1. Mr. J. L. Hyslop, manager of the Belfast undertaking, estimates that the additional cost to domestic consumers under the proposed scales will amount on the average to approximately 3d. per week.

In a report to the Gas Committee, Mr. Hyslop states that the recent increases in the price of coal which it was estimated would average 12s. 10d. per ton would cost the department over £156,000 a year. He said that during the recent financial year the total extra cost for coal would be over £120,000, but after allowing for increased revenue from coke this would be reduced to a net figure of £90,000. The proposed increase will yield approximately £44,000 during the year, and will fall short of requirements by approximately £46,000.

Rises in Other Towns

A rise in the price of gas is also probable in Ballymena. A local official said: "The cost of gas is under consideration at the moment, and it is quite likely that an increase will be decided upon—probably something in the neighbourhood of 8d."

Proposals for increases from Lisburn and Lurgan are being examined by the Ministry of Commerce at the moment. It is understood that in the case of Lisburn an increase of 1s. has been requested, bringing local prices up to 9s. 6d.

Lurgan Borough Council are awaiting sanction from the Ministry for an increase in charges in their area of 8d.

Coleraine Borough Council will also consider prices at its next meeting.

Bangor Borough Council has received permission from the Ministry of Commerce to increase the price of gas to 6s. 8d.

In Londonderry the price of gas was increased by 2d. per therm on September 1, making the present charge 1s. 10½d. per therm. "No further increase is contemplated in the near future," an official said.

New Midland Service Centre

The chairman of Coseley Urban District Council, Councillor Mrs. Violet Turton, opened the West Midlands Gas Board's new service centre in Castle Street, Coseley, on Thursday, September 22. The Chairman of the Board, Mr. G. le B. Diamond, welcomed many Coseley councillors and council officials. With him was Mr. Stanley Jones, divisional general manager for Wolverhampton and district.

The premises are the first that the Board has had in Coseley: Until Thursday Coseley residents had to take their problems to Bilston or Wolverhampton.

W. C. HOLMES' APPRENTICES VISIT N.E. GAS BOARD

Under their apprentice training scheme, W. C. Holmes & Co., Ltd., include visits to undertakings where their plant is installed. These visits enable the apprentices to see how the gas industry serves the public. This photograph was taken recently during a visit by the apprentices to the Tingley Works of the North Eastern Gas Board.

Maidenhead Gasholder Opposed

The Maidenhead Town Council are to ask the North Thames Gas Board to consider the possibility of siting a proposed new gasholder, 120 ft. in height, at Slough instead of at Mill Lane, Taplow. The holder is required for Maidenhead and district only and the Board's technical experts say that it cannot be reduced substantially in height without a considerable increase in cost. Coun. Wood, of Maidenhead, the Chairman of the Council's Development and Planning Committee, said that they would bring all possible pressure to bear in order to prevent the holder from being erected almost on the Thames side in one of the local beauty spots. The Gas Board were anxious to co-operate as far as possible in helping to preserve local amenities.

On October 28, the London Industrial Co-ordinating Committee of the Royal Society for the Prevention of Accidents is holding their annual one-day conference at the Guildhall. The Rt. Hon. the Lord Mayor of London, supported by Sir Walter Monckton, K.C.M.G., K.C.V.O., M.C., Q.C., M.P., Sir George Barnett, and Sir Howard Roberts, C.B.E., D.L., have agreed to be present. Applications for tickets to the conference, price 10s. 6d., should be sent to H. A. Meanley, Hon. Treasurer, London Industrial Co-ordinating Committee, North Thames Gas Board, King's Road, Fulham, S.W.6

Scottish Oil Gas Plant

Scotland's first catalytic oil gasification plant is to be built at Dundee and will produce from oil a gas very similar to the present coal variety. Mr. W. S. Johnston, Dundee district group manager of the Scottish Gas Board, said at Dundee Rotary Club on September 15 that final plans would be completed within the next month or two. The plant should be operating within the next two years and its capacity would be 3 mill. cu.ft. of gas per day.

Wales and Monmouthshire Juniors Works Visit

A visit to the factory of Dendix Industrial Brushes, Ltd., Chepstow, Mon., was made by the Wales & Monmouthshire Junior Gas Association on Thursday, September 29, as part of their opening meeting of the 1955 to 1956 session. Forty members were conducted on a tour of the factory by Mr. G. Phillips, the works superintendent, and were shown the full process of manufacture of industrial and domestic brushes of every description. The Dendix factory, which employs 200 people, is completely modern and the main workshops are heated by suspended gas heaters in addition to coke burning stoves. Very little use of gas is made in the actual machinery, but two 'veteran" machines used in branding Government issue shoe brushes have been in use since 1947 and are still going strong. Gas is also used in the soldering department and with the works canteen using gas exclusively for cooking purposes the factory's average monthly consumption is just over 5,000 cu.ft.

New President

Following the visit, Mr. C. E. Banham, of Cardiff, was installed as the new Association President, at an informal ceremony in which Mr. Banham presented Mr. Woodcock with a silver salver.

The new President referred to the fact that Mr. Woodcock had been the first President of the North Wales Section, an office he had held for three years, and was the first Association President to come from North Wales. His successful year of office had been marred by the serious illness which prevented him from reading his own Presidential address. Mr. Banham has been treasurer of the Association for the past 15 years and has now given up that office. Among the Association members present was Mr. J. F. Rust, manager of the Newport undertaking, who is to retire in the near future after 50 years in the industry.

SAFE-DRIVING FLEET

Photograph shows the entries from the Transport Department of Sidney Flavel and Co., Ltd., Eagle Foundry, Leamington Spa, competing in the Coventry Road Accident Prevention Council's 'Lorry Driver of the Year' Competition.

EASTERN JUNIORS PRESIDENTIAL MEETING

The Eastern Junior Gas Association held its Presidential meeting for 1955 at Norwich on September 24, by invitation of the Eastern Gas Board and Mr. R. A. Weston, M.B.E., General Manager of the Norwich Division.

Chief guests were Mr. J. H. Dyde, Eastern Gas Board, Mr. E. H. Harman, Deputy Chairman, East Midlands Gas Board, Mr. R. H. Epps, Secretary, Eastern Gas Board and Mr. Bernard Clarke, General Manager, Lincolshire Division, East Midlands Gas Board.

The business meeting held in the morning was at the Samson and Hercules House. Attending the lunch which followed were 147 members, guests, and their ladies. Mr. F. G. Cox, Distribution Superintendent of the Norwich Division, was inducted as President for the 1955-56 session and in performing this duty Mr. R. F. Robinson, Watford, remarked upon the 'wonderful attendance' which he felt quite sure augured well for Mr. Cox's year of office.

Mr. Cox then gave his presidential address. He also presented Mr. Robinson, the retiring President with an illuminated address, thanking him for his valuable services to the Association, and referring to the progress the Association had made under his leadership.

After lunch the company took advantage of the usual 'President's Day' fine weather to enjoy a motorboat trip on Wroxham Broads. Then they were entertained to tea at the Swan Hotel, Horning, again by invitation of the Eastern Gas Board.

A vote of thanks to Mr. R. A. Weston, General Manager, Norwich Divjsion, was proposed by Mr. A. B. Scott, a member of Council, who expressed the Association's appreciation of the hospitality extended by Mr. Weston and the Eastern Gas Board.

Scots Invent Safety Meter

Two Scots inventors, appalled at the increasing loss of life by gassing tragedies in the home (they are more than four a week in Scotland) have now perfected a safety valve for shilling-in-the-slot gas meters. The inventors—Mr. George Meek, of Dumbarton, and Mr. Adam McCulloch, of Cardross—were spurred in their patient and careful research into perfection of their 'caco' valve by the fact that gas claimed 35 lives in Scottish homes in 1939 and had increased to 220 in 1953 (the last year for which official figures are available).

Mr. Meek and Mr. McCulloch have patented their special magnetic 'cut-off safety valve' and at long last, after final modification and improvement their invention has received the official approval of the Gas Board's Watson House Laboratories in London.

A domestic gas ring was lit in Mr Meek's factory in Dumbarton. A shilling which had been placed in an ordinary gas meter was exhausted and the flame went out. Another 1s. was dropped into the meter—but no gas issued out.

Because in a great number of gassing fatalities, the tragedy has been caused through a member of the household putting a coin in the meter, unaware that a gas tap has been left open in another room, one of the main features of the valve is that not only does no gas issue from the actual tap left 'on,' but no gas will come from any other tap served through the same meter—until all have first of all been turned off. The valve, which it is hoped will be introduced into many of the million homes in Scotland with shilling-in-the-slot meters, is expected to be supplied for under £2.

Welsh 'Bride of the Year' Final

The final of the 'Bride of the Year' competition of the Wales Area took place at the City Showroom of the Cardiff Undertaking on September 29, 1955. The Wales Gas Board invited the wife of the oldest serving employee of the Cardiff Undertaking to present the prizes. The lady so selected was Mrs. M. Clarke whose husband, Mr. Jack Clarke, has been a driver-mechanic with the Cardiff gas undertaking for nearly 53 years. The presentation was presided over by Mr. T. Mervyn Jones, Chairman of the Wales Gas Board, and the judges were Miss E. M. Davies, B.SC., Principal of the Training College of Domestic Arts for South Wales and Monmouthshire and Mrs. E. Baker, who for many years was the senior lecturer in cookery at this college. The competition was won by

Mrs. M. Sanderson who comes from the little town of Usk in Monmouthshire and who will, we are quite sure, worthily uphold the reputation of Wales in the National Final.

Top.—The Chairman of the Board congratulating Mrs. Sanderson; also included in the picture is Mrs. M. Clarke, who presented the prizes.

Left.—A general view of the competition in progress, showing how the competitors were able to work in comparative privacy in cubicles of their own.

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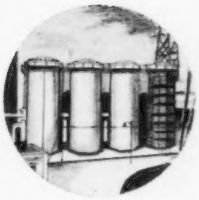

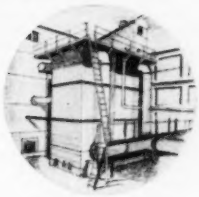

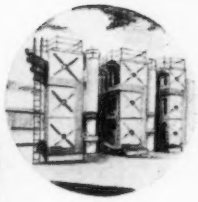

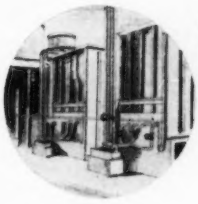

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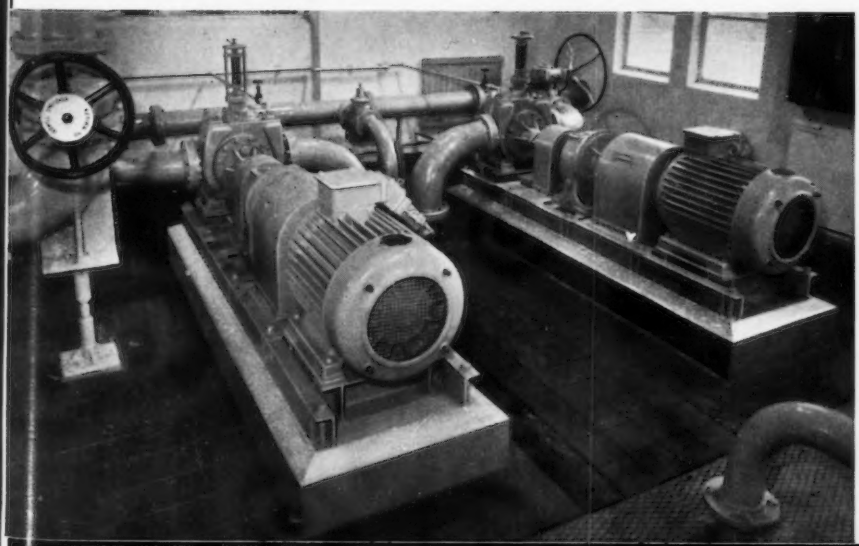

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These steam-jacketted rotary displacement pumps are lifting viscous tar from deep tanks. Each has a capacity of 10,000 gallons per hour, running at a speed of 360 r.p.m., against a discharge pressure of 50 lbs. per sq. inch.

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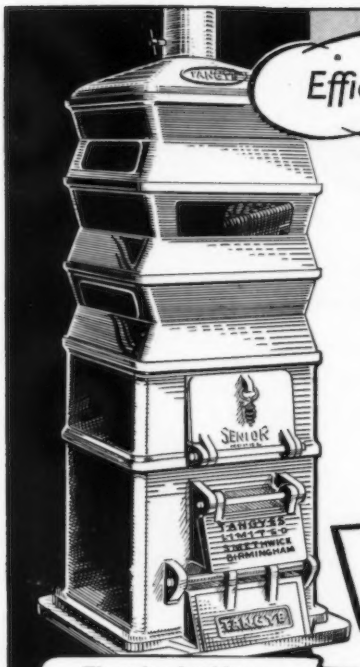

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PUBLISHERS' NOTICE

The " Gas Journal " is published every Wednesday, price **1/6d.**; by post **1/8d.**

Subscription Rates: Home and Empire:—**60/-** per annum; Foreign:—**70/-** per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at **2/-** per line (approx. **7** words)—minimum charge **10/-**. A Box Number address occupies **2** lines, and a further **6d.** is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received **14** days prior to publication if proofs are required. Type area of inside pages **10** in. deep × **7** in. wide; block screen **120**.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. *Telephone:* King's Norton 3868.

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN REPRESENTATIVE: A. Engelhardt, 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Fleet Street 2236-7.

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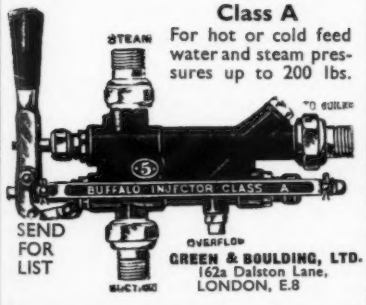
Class A

For hot or cold feed water and steam pressures up to 200 lbs.



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FOR SALE: NEW GAS-FIRED BOILER by Hartley & Sugden. 160 lbs./hour at 80 lbs. p.s.i., complete with chimney, spare burner and controls. Original purchase price was £419. Our price £200. W. H. COLLINGBOURNE & CO., LTD., 1481, Stratford Road, Birmingham, 28. Phone: Shirley 3303.

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive or a woman aged* 18-59 *inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order,* 1952.

SCOTTISH GAS BOARD

GLASGOW DIVISION
GLASGOW DISTRICT
SUPERINTENDENT—MAINTENANCE SECTION
GRADE A.P.T. IX (PROV. A)—£700-£800

APPLICATIONS are invited for the above position. Candidates should have experience of installation and maintenance of all types of Domestic and Industrial Appliances, and preferably have qualifications in Gas Supply or Engineering.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications endorsed 'S/MS.' stating age, experience and qualifications, together with the names of two Referees, should be sent to the undersigned not later than October 24, 1955.

D. F. YOUNG,
Divisional Controller.

9, George Square,
Glasgow, C.2.

SCOTTISH GAS BOARD

DUMBARTON/HELENSBURGH DISTRICT
WORKS SUPERINTENDENT, HELENSBURGH

APPLICATIONS are invited from suitably qualified Gas Engineers for the position of WORKS SUPERINTENDENT, Helensburgh. Candidates should preferably have practical experience of the control and operation of Glover-West Vertical Retorts and automatic C.W.G. plants and be capable of supervising the general operation of the works, which produces 260 million cubic feet of gas per annum.

The salary will be within Grade 6 (£565-£645 per annum) of the National Salary Scales for Gas Staffs.

A new bungalow, situated in the residential area of Helensburgh, is available at a rent of £37 per annum.

Applications, stating age and particulars of training, experience and qualifications, should reach the undersigned not later than Monday, October 24.

ALEXANDER MCFADYEN,
Engineer and Manager.

Gas Works,
Dumbarton,
October 7, 1955.

INERTOL COMPANY, LIMITED, West Carr Lane, Stoneferry, Hull, specialising in protective coatings for concrete and steel have vacancy for ASSISTANT CHEMIST, preferably with some previous experience in coal tar and bituminous by-products. Salary will be according to experience and there are good prospects for the right person. The position is pensionable. Applications, giving age and experience, along with *copies* of Refs. should be addressed to the Secretary.

SOUTHERN GAS BOARD

PURCHASING OFFICER

APPLICATIONS are invited from suitably qualified persons for the appointment of PURCHASING OFFICER in the Commercial Manager's Department of the Board at a commencing salary of £1,400 per annum.

Applicants should have a sound experience of purchasing materials and equipment, preferably as used in the Gas Industry. They should also be experienced in the scrutiny of tenders and contracts.

The successful candidate will be required to co-ordinate purchasing throughout the Board and to negotiate centrally contracts for the supply of materials and equipment.

He will be required to pass a medical examination and, unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required to join the Board's Staff Pension Scheme.

Applications stating age, education, qualifications, training, experience, present appointment and salary, together with a one-page summary of these particulars, should be sent in an envelope marked " Purchasing Officer " to the Secretary, Southern Gas Board, 164, Above Bar, Southampton, to reach him not later than November 12, 1955.

SOUTHERN GAS BOARD

EASTERN DIVISION
DEPUTY GROUP ACCOUNTANT

QUALIFIED accountants are invited to apply for the position of DEPUTY GROUP ACCOUNTANT of the Portsmouth Group of the Southern Gas Board. This Group is the largest in the Board and serves 135,000 consumers.

The position calls for a man keenly interested in accounting and costing techniques; able to plan and organise work; control staff; and anxious to give the best possible service to Management. Experience in the gas industry, though desirable, is not essential.

A start has already been made on a fully integrated system of flexible budgetary control and standard costing, and the successful applicant will be expected to make himself fully conversant with all aspects of this work.

The commencing salary will be £1,150 per annum, and the successful applicant will be required to pass a medical examination and, unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations 1950, will be required to join the Board's Staff Pension Scheme.

Applications giving particulars of age, education, qualifications, experience and present salary together with a one page summary of these details, should reach the Secretary, Southern Gas Board, 164, Above Bar, Southampton, not later than November 7, 1955.

October 6, 1955.

(*Classified advertisements continued on page* 150)

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APPOINTMENTS VACANT (*ctd.*)

WEST MIDLANDS GAS BOARD

NORTH STAFFORDSHIRE DIVISION
STAFFORD DISTRICT
WORKS CHEMIST

CANDIDATES should hold an appropriate qualification and should have had a comprehensive training and experience in all aspects of chemical control of gas works plant and processes.

The salary will be within Grade 7 (£620-£700 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications, giving details of age, qualifications and experience, together with the names of two referees, should be addressed to Mr. J. E. Stanier, Divisional General Manager, West Midlands Gas Board, Etruria Gas Works, Stoke-on-Trent, to reach him not later than October 31, 1955.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

BIRMINGHAM & DISTRICT DIVISION
CHEMIST
DIVISIONAL ANALYTICAL LABORATORY

THE person appointed should have a University Degree or equivalent in Chemistry, and be experienced in the Gas Industry or some branch of the Chemical Industry.

The salary will be within Grade 9 (£700-£800 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable, and the successful applicant may be required to pass a medical examination.

Applications stating age, personal details, qualifications, particulars of training and experience, together with the names of two referees, should be addressed to Mr. J. E. Wakeford, Divisional General Manager, West Midlands Gas Board, Birmingham and District Division, Gas Offices, Edmund Street, Birmingham 3, to reach him not later than October 31, 1955.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

CHIEF ACCOUNTANT'S DEPARTMENT
AUDIT ASSISTANT

THE successful candidate will be posted to the Board's Divisional Offices at Shrewsbury and will be responsible under supervision for internal audit work in the Shropshire Division. Applicants should preferably have passed the intermediate examination of a recognised accountancy body and have had audit experience.

The salary for the post will be within Grade 8 (£660-£740 per annum) of the National Salary Scales.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him not later than October 31, 1955.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

BIRMINGHAM DIVISION
DIVISIONAL ACCOUNTANT

APPLICATIONS are invited from qualified accountants for the above position.

Essential requirements are a sound experience of financial and accountancy organisation and the ability to direct and control a large staff. An additional qualification would be experience of mechanised systems appropriate to a public utility undertaking, including hire purchase accounts.

The commencing salary will be £1,700 per annum.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him not later than October 31, 1955.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WALSALL AND DISTRICT DIVISION
SENIOR CHEMIST—CANNOCK GROUP

CANDIDATES should have had a comprehensive training and experience in all aspects of chemical control of Gasworks plant. A recognised qualification in chemistry would be an advantage.

The salary for the post will be within the range of Grade A.P.T. 7 (£620-£700 per annum) of the National Salary Scales.

The post is superannuable, and the successful applicant may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. F. Harvey, Divisional General Manager, West Midlands Gas Board, Walsall and District Division, Divisional Offices, Walsall Factory Estate, Tame Bridge, West Bromwich Road, Walsall, to reach him not later than October 31, 1955.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

BIRMINGHAM DIVISION
ASSISTANT COKE OFFICER

THE person appointed will assist the Divisional Coke Officer in organising sales, handling complaints and queries of a varying nature, keeping statistical records and compiling returns. A knowledge of coke production and screening, the general characteristics of coke, coke burning appliances and the various grades of fuel used therein is desirable, but applications from persons possessing knowledge only of other forms of solid fuel and appliances will be acceptable.

The salary will be within Grade 10 (£760-£860 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable, and the successful candidate may be required to pass a medical examination.

Applications, stating age, training, education and experience, together with the names of two referees, should be addressed to Mr. J. E. Wakeford, Divisional General Manager, West Midlands Gas Board, Gas Offices, Edmund Street, Birmingham, 3, to reach him not later than October 24, 1955.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

CHIEF ACCOUNTANT'S DEPARTMENT
SENIOR AUDIT ASSISTANT

THE successful candidate will be posted to the Board's Divisional Offices in Birmingham and will be responsible to the Chief Accountant for internal audit work in that Division. Applicants should preferably be qualified accountants and have had experience of the audit of accounts of a public utility undertaking.

The salary for the post will be within Grade II (£785-£910 per annum) of the National Salary Scales.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him not later than October 31, 1955

J. C. INGRAM,
Secretary to the Board.

WALES GAS BOARD

CARDIFF UNDERTAKING
SALES SUPERINTENDENT

APPLICATIONS are invited for the above-mentioned appointment of SALES SUPERINTENDENT—to be responsible to the General Manager for all domestic and commercial gas and appliance sales and the district organisation connected therewith, including the direction of sales staff, training, estimating, canvassing and new housing development; publicity, home service, contact with planning authorities, local housing and education authorities, architects and builders; liaison with distribution engineer on service work, and with other departments to secure adequate and satisfactory service to consumers.

The salary will be within the Scale A.P.T. Grade 12 (£835/£960). The post is superannuable and the successful applicant will be required to undergo a medical examination.

Applications, stating age and giving full particulars of education, training, qualifications, together with the names of two referees, should be submitted to the undersigned within 14 days of the appearance of this advertisement.

J. POWDRILL,
General Manager and Engineer.

Bute Terrace,
Cardiff.

R. & J. DEMPSTER LTD.

SENIOR DRAUGHTSMAN

Excellent opportunity occurs for Senior Draughtsman with H.N.C. qualification. Duties will include the control of junior draughtsmen and taking out schedule of materials, etc. Experience in pressure vessels would be an advantage.

The position is a responsible one and will carry an appropriate salary. Pension scheme in operation.

If necessary, the question of accommodation is one which could be discussed with the successful applicant.

Applications, which will be treated in the strictest confidence, should give full particulars of age, education and experience and should be addressed to:

The Secretary,
GAS PLANT WORKS,
MANCHESTER 10.

DOMESTIC UTILISATION OF GAS

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20/- *inc. postage*

WALTER KING, LTD.

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'Phone: Northern 0989. 'Grams: Reckoners, B'ham.

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by the use of
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Sole Importers:
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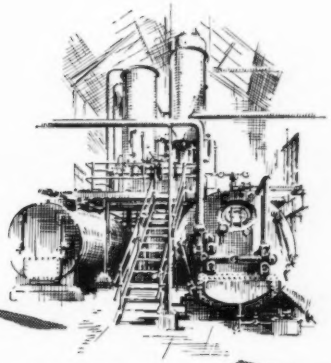
On publicity

A wight there was made business at the fairs,
His discourse witched the good folks buy his wares.
Yet, as they found who listed to his talk,
T'were hard to know his business—cheese or chalk.
Bold was his wit, and knit with hardiness;
His matter was the Cosmos—nothing less.
Done and departed, freed from his bemuse.
One found his bargain would be: Two left shoes.

But had he dared to state his case in print
(Sweet are the uses of advertisement).
Having a name to make or mar, in sooth,
Wealth would be only won by worth and truth.

As Chaucer might have written.

FOUNDED 1850
HOLMES
HUDDERSFIELD



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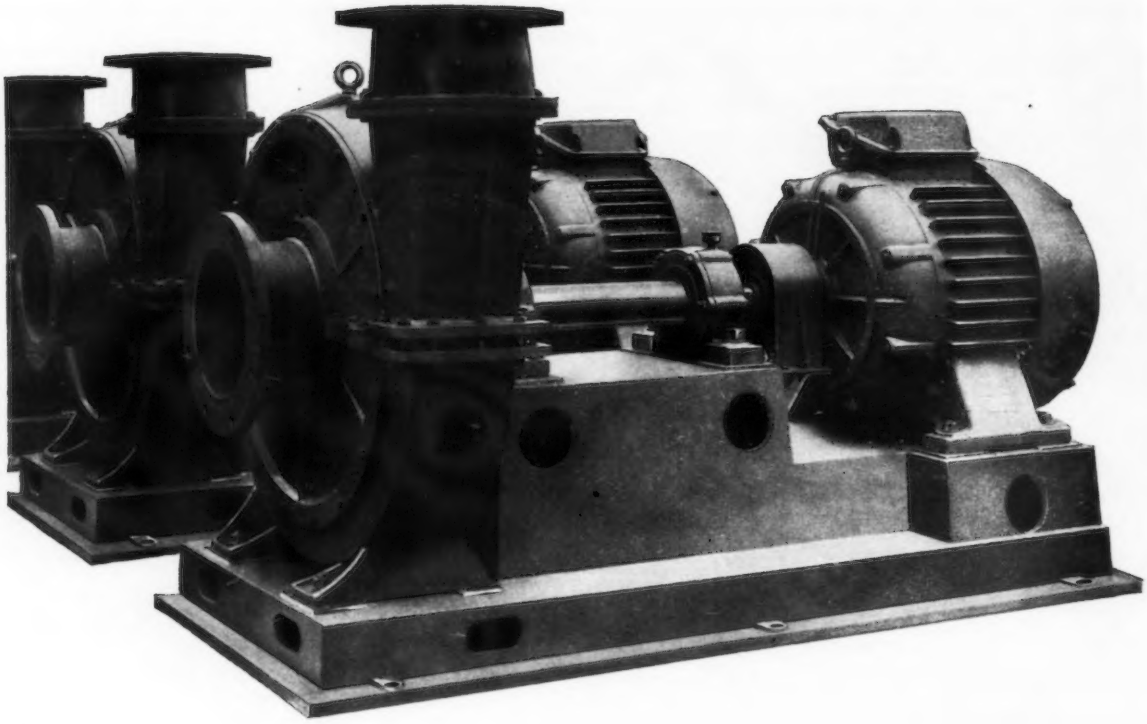
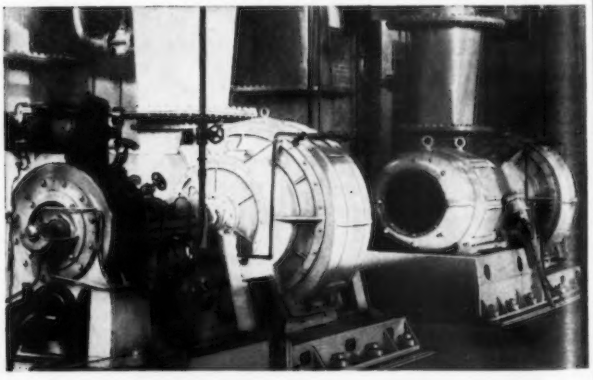


Gas Boosters?

Photo by courtesy of the S. E. Gas Board and Humphreys & Glasgow Ltd.



EXAMPLES of gas boosting fans with cast iron casings are illustrated here. They represent the results of special attention to the design and development of robust, trouble-free boosters over the years. This experience provides fans for handling volumes of 5,000 to 1½ million cubic feet of gas per hour at pressures up to several pounds per square inch.
When the time comes you'll find there's no easier way to solve your air or gas moving problem than to put it to Keith Blackman.

contact **Keith Blackman Ltd**

MILL MEAD ROAD · LONDON · N17 · TOTtenham 4522

T.A.722/610

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CONTINUOUS VERTICAL RETORTS

C.O.L.
INTERMITTENT VERTICAL CHAMBERS

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COKE OVENS

WEST'S GAS IMPROVEMENT CO. LTD
ALBION IRONWORKS · MILES PLATTING
MANCHESTER 10
Telephone: COLlyhurst 2961 Telegrams: Stoker, Manchester

AND IN LONDON:—
Columbia House, Aldwych, W.C.2. Tel: HOL 4108 Grams: Wesgasco,Estrand
C.O.L. Div: Chandos House, Buckingham Gate, S.W.1. Tel: ABBEY 6912

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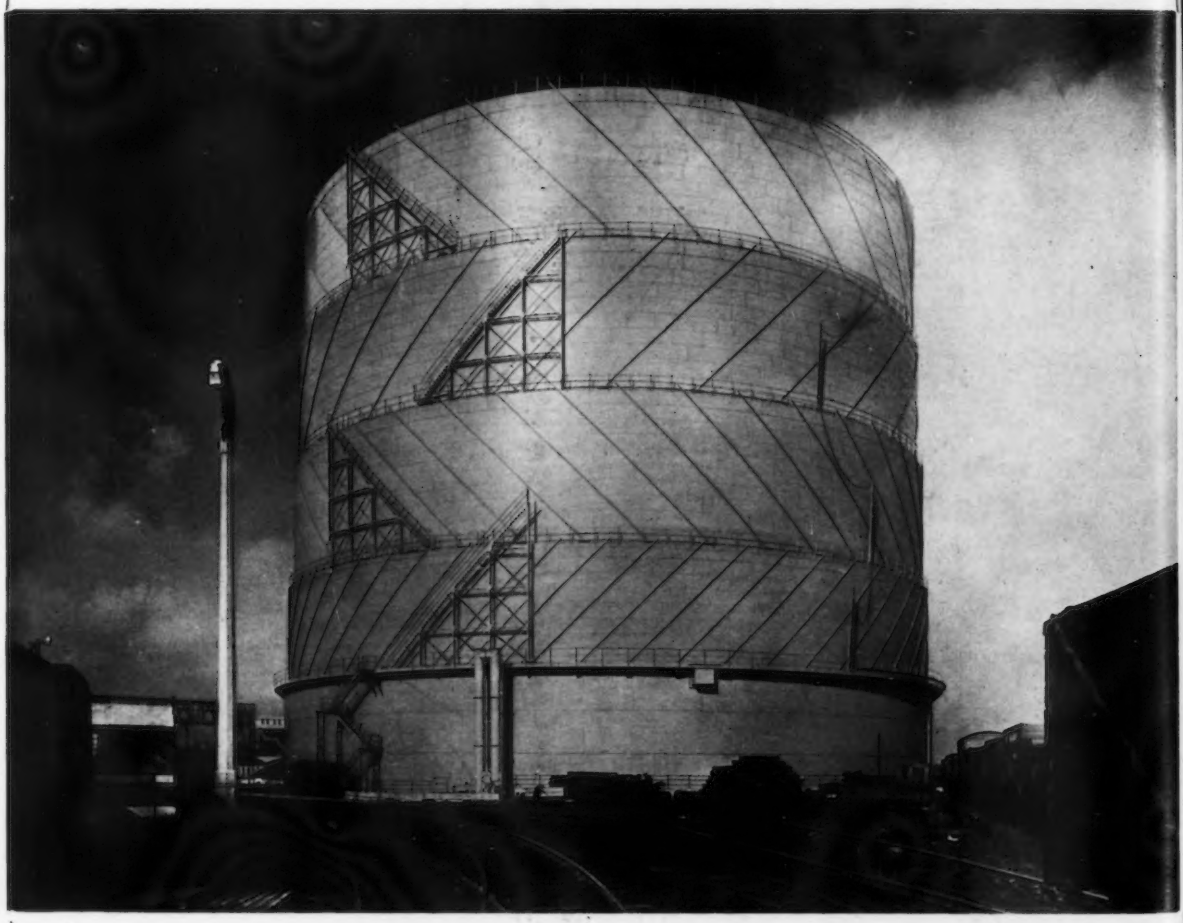

COMPLETED MAY 1953 AT

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